OCTOBER 26, 1944

American Machinist

TECHNOLOGY DEPT.
OCT 30 1944
DETROIT

Plastic Masters Assure Accurate Checking of Jigs

•

Pneumatic Clamps Simplify Tooling

•

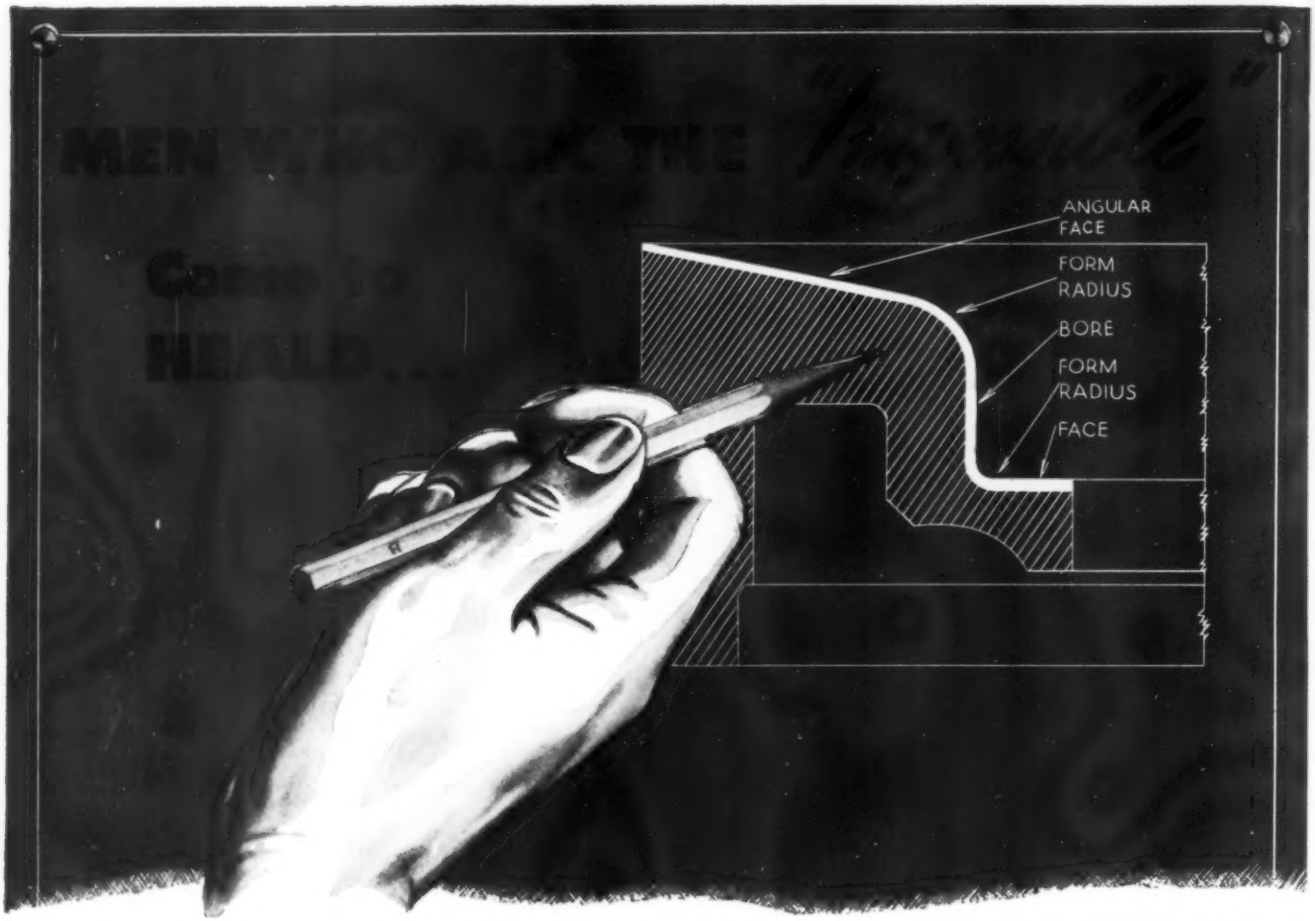
Mobile Units Take Training To Front Line Airfields

•

Thread Milling Cutters

Postwar Boom Expected

BASED ON A SURVEY OF METAL-WORKING EXECUTIVES



AND GET IT WITH *Precisioneering!*

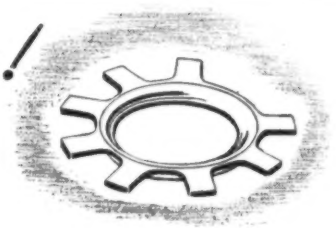
Yesterday's "impossibilities" are today's production achievements. And *today's "impossibilities"* will be the means of putting your post-war product one jump ahead of competition.

Finding ways to step up production rates . . . or finish more surfaces per machine . . . or hold closer tolerances . . . or minimize rejects. In short; to make a better product at lowest possible cost.

. . . is the essence of what Heald *Precisioneering* offers you. And it inevitably results when we add custom-built tooling and fixtures to a carefully selected basic machine design.

Why not sit down with some of the 250 *Precisioneers* at Heald Headquarters in Worcester . . . or call in one of our local field engineers. They will offer for your consideration *proved* ideas and production methods for improving your boring, turning, facing and grinding operations.

THE HEALD MACHINE CO.
WORCESTER 6, MASS.



Another Example of
PRECISIONEERING RESULTS

Formerly **two machines were needed to finish this knuckle pin locking plate. It was a tricky operation as the section view at top shows. Production lagged. *Now*** **a single Bore-Matic bores a 4.0455" hole, forms a .06" radius and generates the bottom face; generates the 14° angular face and plunge cuts a .13" radius to blend with it and the bore — *all automatically!***

HEALD *for precision plus . . . economy plus*

and Surface Grinding Machines • Bore-Matic Precision Finishing Machines

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American Machinist

October 26, 1944

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From _____

_____

To _____

_____

Signed _____

American Machinist Chips

Word from Britain . . . As you thumb back through this issue, you will find that Burnham Finney's usual editorial is now being cabled from London, and to our mind makes very interesting and significant reading.

Not to be outdone, Bill Hargest again comes through with an article from the same shores—describing a mobile training unit for pilots and crews of aircraft, instituted to keep combat personnel closer to the front.

New Miller . . . Cause of considerable comment recently was a new automatic machine tool introduced by Cincinnati Milling Machine Company. It mills cooling fins on four aircraft engine cylinder heads simultaneously. Hydraulic and electrical systems control the cutting spindles, which are guided by templates. The milling results in a head 5 lbs. lighter than one with cast ribs—adds cooling efficiency and hence gains in horsepower.

Welding Trend . . . A prominent manufacturer states that today about 90% of the welding being done is arc-welding—either acetylene or electric. Only about 10% of welding is done by the resistance method.

Enthusiasts for resistance welding feel that before long this ratio might be reversed so that 90% of the welding will be done by the resistance method. It is felt that almost every plant in the country doing any metal-working of any consequence will have to have resistance welding equipment to be competitive in its field.

Postwar Survey . . . Be sure to read the article in this issue high-spotting the results of *American Machinist's* survey of several hundred typical Metal-Working plants throughout the country.

The survey gives prewar, present and expected postwar figures on manpower, production volume and machine tool purchases. It also contains a great deal of supplementary information on reconversion, foreign markets and other subjects of immediate and future concern to production executives.

A compilation of survey results will soon be available in booklet form.

Lubricants for Industry . . . Standard Oil of Indiana recently brought to public attention the development of many special new lubricants, greases and other petroleum products to meet new demands of Metal-Working.

Outstanding are a new lithium soap grease to meet low temperature lubricating specifications; a new product combining corrosion preventive properties with lubricant properties; a special oil for compressors operating at temperatures between 70° and 100° below zero, Fahrenheit.

New Bending Angles . . . Summerill Tubing Company featured in a recent publication many new operations for bending seamless tubing. Shown and described are not only the bending operations, but also equipment and samples of the tubing itself.

From the Mailbag . . . Here are more comments from readers on the value of the advertising pages in *American Machinist:*

"On the average I spend as much time in looking over the advertisements as I do the reading matter." R. O. Catland, Mgr., Aircraft Accessories Corp., Burbank, Calif.

"I read American Machinist *from cover to cover and look forward to each month's number. Quite frankly, I get far more good and information from reading the various articles on discoveries, shop practice, short cuts, etc., than out of the advertisements. Although, I suppose we must subconsciously notice different supply sources and advertising of new devices and file these away for future reference.*

"I first thought that I would tell you that I would continue to read this publication if there was no advertising matter in it. But giving the matter more consideration, I realize that advertisements are beneficial." F. E. Manton, Chief Engr., Manton Brothers Limited, Toronto, Canada.

Growing . . . *American Machinist's* series of feature articles on "Metal-Working Tomorrow" keeps rolling along. Latest in the family is a story on welding and its significance in the fabrication of postwar products. As you can see below, this brings our growing family up to six—and remember, reprints on all these are available.

USE SPIRAL BEVEL GEARS FOR QUIET, TROUBLE-FREE FAN DRIVES

In helping to produce food for the armies at home and at the battle-front, tractors are playing a role equal to the tank in winning the war.

Spiral bevel gears are important factors in dependable, heavy-duty tractor operation. These gears are used for tractor fan drives, because they assure long, trouble-free service life and quiet, smooth and positive operation at the high speeds required.

This application is typical of the highly successful use of spiral bevel gears for all types of fan drives, including air conditioning units and water coolers.

Send in prints to the Gleason Works of the fan drive units in your post-war designs. We will be glad to show you how spiral bevel gears will improve their operation, and prescribe machines for manufacturing the gears.

GLEASON

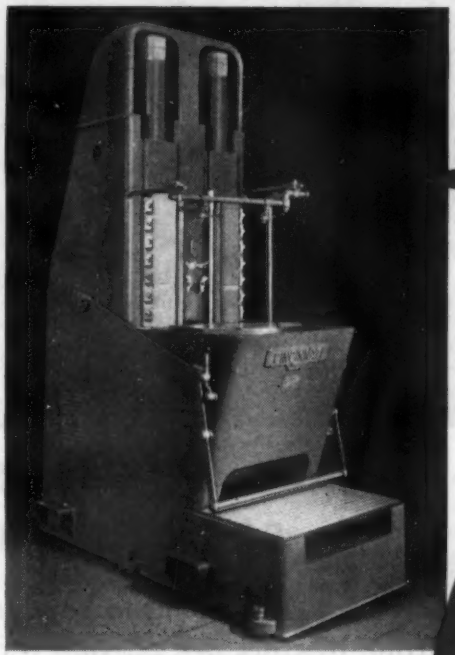
GLEASON WORKS

Builders of Bevel Gear Machinery for Over Seventy-five Years

1000 UNIVERSITY AVENUE, ROCHESTER 3, N. Y., U. S. A.

Can you use this BROACH-SAW *technique?*

One of the most difficult operations on surface broaching machines — the broaching of narrow saw slots — has now been perfected by Cincinnati Application Engineers to the point where it is a routine production job. Two examples are illustrated on the opposite page . . . a cutoff operation, and a broach-saw job combined with the broaching of other surfaces. Does this suggest a more economical method for some of your own work? ¶ Operations of this type on CINCINNATI Hydro-Broach Machines show amazing economies. Remember, too, that *close accuracy* can be maintained, and a *good finish* produced. Our engineers will be glad to discuss all phases of surface broaching with you, and show you how these machines will fit into your production schedules.



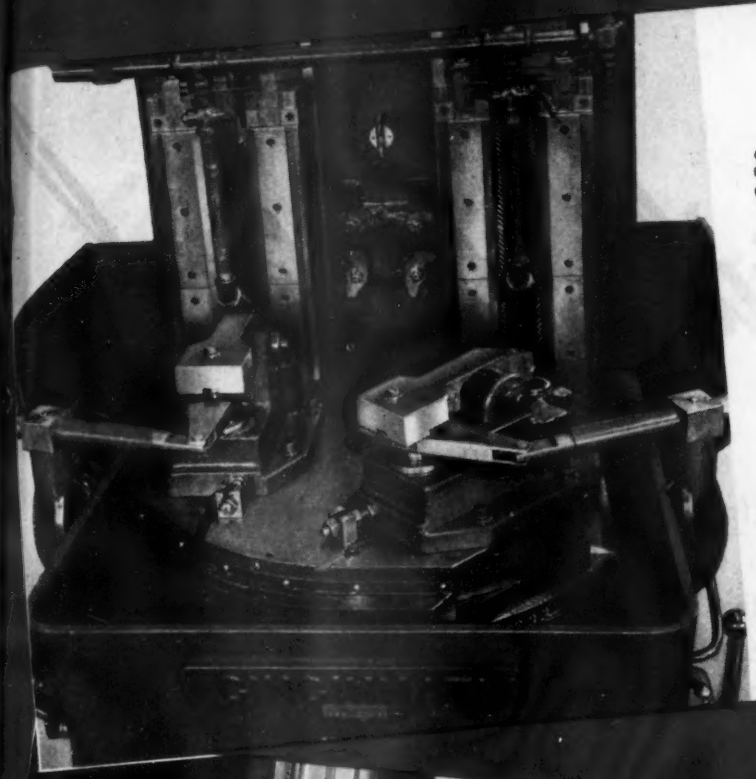
CINCINNATI No. 5-42 Duplex Hydro-Broach Machine. Complete specifications may be obtained by writing for catalog M-894-2. For a brief description of this machine, look in Sweet's Catalog File for Mechanical Industries.

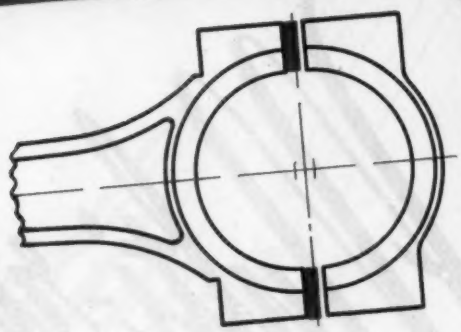
CINCINNATI

Keep on buying WAR BONDS

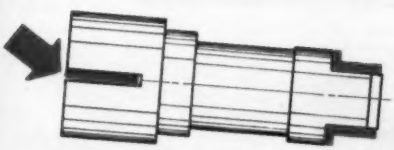
THE CINCINNATI M

MILLING MACHINES





Cutters stay sharp about 20 times longer than the former setup, in the broach cutoff operation illustrated above. The machine is a CINCINNATI *No. 5-54 Duplex Vertical Hydro-Broach.*



A broach-saw operation, combined with the broaching of other surfaces, is being handled in the right-hand station of the above machine . . . a CINCINNATI *No. 3-48 Duplex Vertical Hydro-Broach. Inserts are good for 25,000 to 35,000 pieces per sharpening.*

MILLING MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

Multi-ribbed wheel

We are now equipping Jones & Lamson Automatic Thread Grinders for grinding threads and other forms, with a multi-form wheel. The scope and productive advantages of this method are greatly increased by the **FULLY AUTOMATIC WORK CYCLE OF THESE MACHINES.**

The grinding wheel is diamond dressed by an Automatic Multi-form Trueing Device; consequently an accurate, free cutting wheel is obtained, and either resinoid or vitrified wheels can be used. With this same Trueing Device, the **20-INCH DIAMETER WHEEL** can be dressed for three different methods of multi-ribbed wheel thread grinding, as well as for many varieties of plunge-cut form grinding.

The fully automatic work cycle of Jones & Lamson Thread Grinders means greater production and greater profits. Consult us for recommendations and detailed information. Inquiries will receive our prompt attention.

thread grinding...

Fully Automatic Work Cycle—

Including the Diamond Dressing of the Wheel

THREAD SPECIFICATION

1-3/16" — 12 N. S. — Class 3

MATERIAL

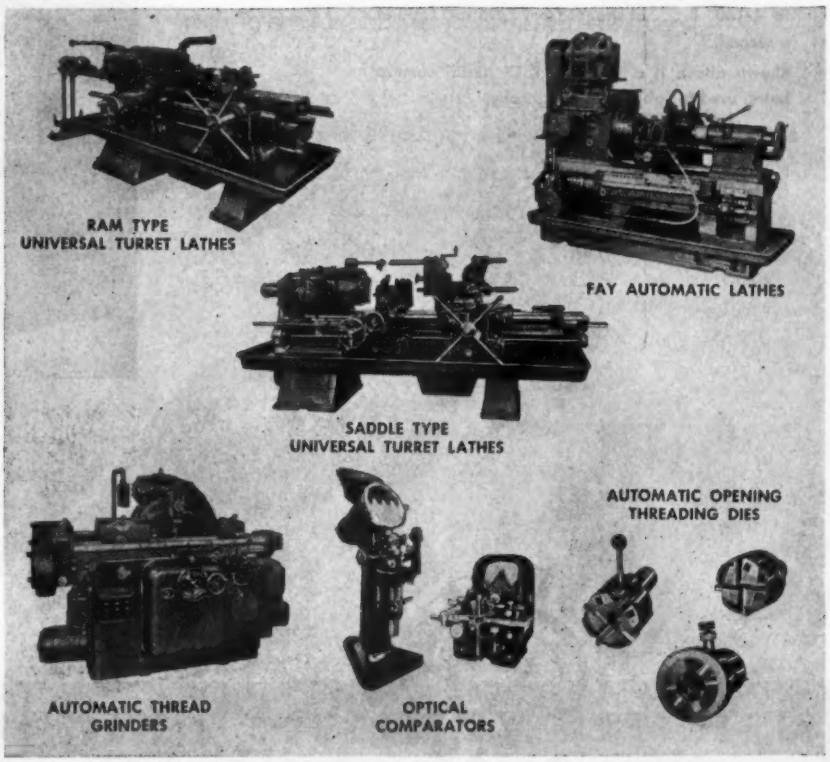
SAE — 4620 — Heat treated

MACHINE CYCLE

29 seconds per piece — 20 pieces between wheel dressings.

WHEEL DRESSING CYCLE

35 seconds. Controlled by electric counter, thus maintaining fully automatic work cycle.



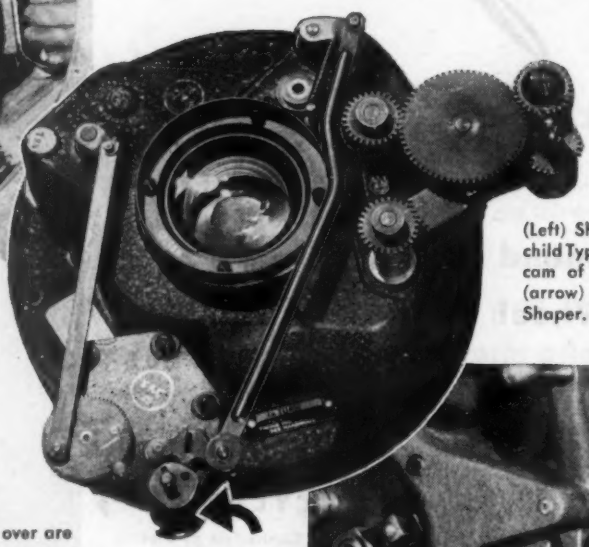
JONES & LAMSON
MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

Aerial Cameras THAT S

DEPEND ON



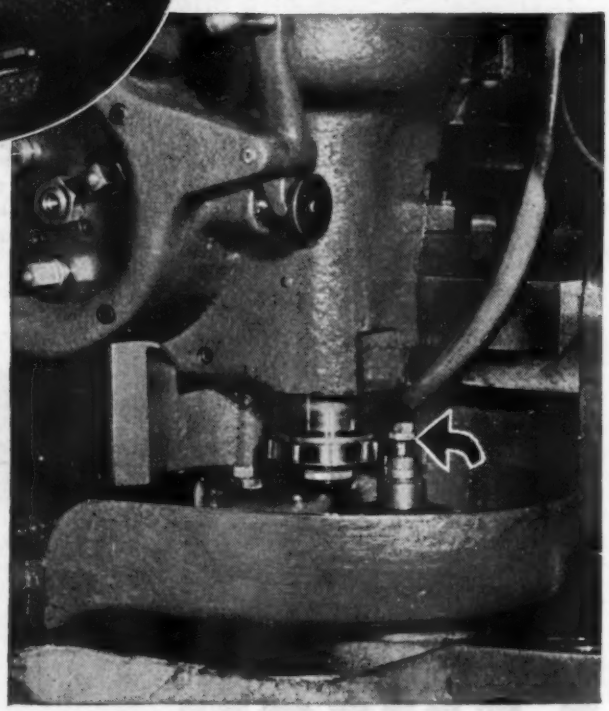
(Left) Shutter and 6" lens of Fairchild Type K17 aerial camera. Speed cam of shutter retard mechanism (arrow) is cut on the Fellows Gear Shaper.

FAIRCHILD AERIAL CAMERAS

In this war, our Army and Navy *know* that their bombs, their shells, will fall on the enemy's vital spots. The reason is, the accuracy of aerial photography.

The bulk of aerial cameras used by the American armed forces the world over are the product of Fairchild Camera and Instrument Corp., New York. These precision cameras take high-speed shots at altitudes up to 7 miles. The heart of this camera is its between-the-lens shutter . . . built to operate at temperatures from —70° F. to +140° F. . . . at speeds from 1/25 to 1/500 of a second.

Shown above is a Fairchild K 17 aerial camera being used for oblique photography.



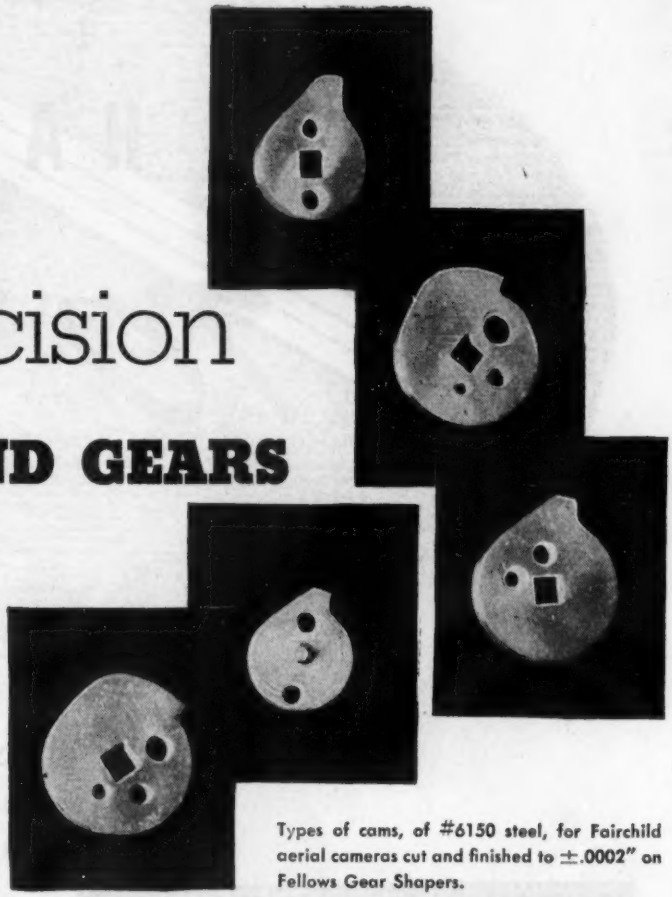
Fellows 7-type Gear Shaper in Fairchild's Jamaica, N. Y., plant machining shutter cam seen on K17 shutter above.

THE FELLOWS METHOD . . . MACHINES AND TOOLS FOR AL

SAVE MEN'S LIVES

Sustained Precision

OF TINY CAMS AND GEARS



Types of cams, of #6150 steel, for Fairchild aerial cameras cut and finished to ±.0002" on Fellows Gear Shapers.

That's why Fairchild relies on the Gear Shaper to cut camera parts —to tolerances of ±.0002"

The Fellows Gear Shapers in the plant of Fairchild Camera and Instrument Corporation have been working almost continuously since Pearl Harbor.

For theirs is the task of cutting and finishing the cams and gears used in the shutters of the highly accurate Fairchild aerial cameras.

To those who know the Fellows Method, it goes without saying that of all the thousands of cams and gears Fairchild has produced in these years, the last has the same precision as the first. For each Fellows cutter is engineered and made for the exact design it is to create. Once this design is established, the precision of the work follows inevitably . . . and when new cutters are needed, they too are exact duplicates of the original.

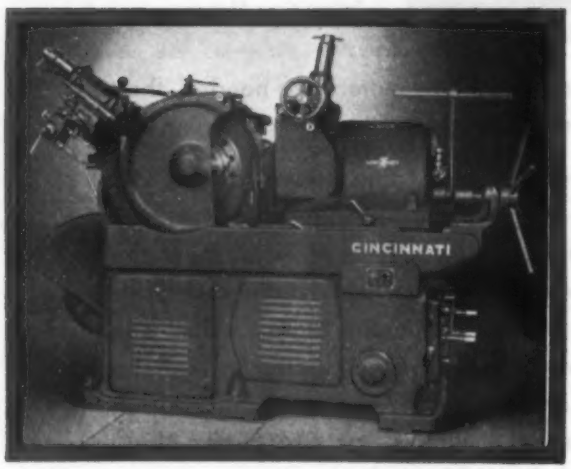
For gears . . . for cams, pawls, splines, and other irregular shapes where *sustained precision* is vital, you should know how the Fellows Method can help you in your post-war planning. For literature, write: The Fellows Gear Shaper Company, Springfield, Vermont—or 640 West Town Office Bldg., Chicago 12, Illinois—or 616 Fisher Bldg., Detroit 2, Michigan.

Fellows

ALL OPERATIONS FROM BLANK TO FINISHED GEAR

IT HAS TO BE TO GRIND

CINCINNATI



CINCINNATI *No. 2 Centerless Grinding Machine. Catalog G-456-2 contains complete specifications. For a brief description of the Centerless Machines, look in Sweet's Catalog File for Mechanical Industries.*

You can't afford to spend a lot of time or money machining plastics, and that's why CINCINNATI Centerless Grinders fit so well in the production of such parts. These machines are used extensively for grinding operations on plastic pool balls, electrical insulators, bowling balls, poker chips and tubes and rods of various diameters and lengths. Stock removal may vary anywhere from a fine finish of a few thousandths to a rough grind of rounding up square bars. ¶ The centerless method is ideal for grinding a wide range of parts made from all types of metallic and nonmetallic materials. Cincinnati Application Engineers offer you the benefit of their 20 years of experience in improving centerless grinding procedure.

Keep on buying WAR BONDS

CINCINNATI

CENTER TYPE GRINDING MACHINES

FAST

PLASTICS

Grinding plastic tubes on a CINCINNATI *No. 2 Centerless Grinder. Stock removal .050" to .075", at a production rate of well over 100" per minute.*

GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

FIRST CHOICE FOR BALL-RACE

VAN NORMAN

OSCILLATION RADIUS GRINDERS

MORE BALL BEARING RACES ARE GROUND ON VAN NORMAN MACHINES THAN ON ANY OTHER GRINDERS

Ever since they were first introduced in 1914, Van Norman Radius Grinders have been the "Standard" for grinding ball races and other spherical surfaces. And today, they still predominate in the ball bearing industry.

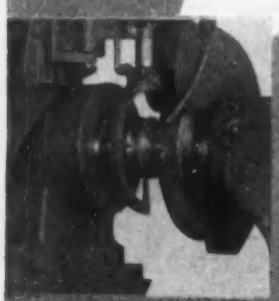
Their popularity is due to their accuracy, efficiency, ease of operation and low maintenance costs . . . all of which result in high production at low cost.

Van Norman features — such as electronic gauging, continuous feeds, wide angle oscillation, diaphragm chucks, wide variety of grinding cycles and automatic operation— assure a steady output to close tolerances whether it be ball races or other spherical parts. Van Norman grinders have a built-in facility for grinding double row races. They are available in a wide range of standard models as well as numerous specials with capacities from 3/8" to 40" diameter. Special attachments are available for grinding magneto-type bearings.

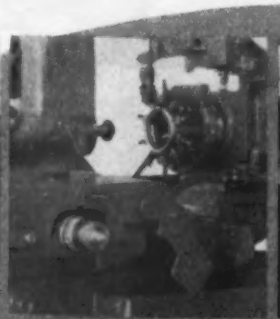
Our engineering department and field engineers are available for consultation and the solution of your grinding problems. Write for their services.

VAN NORMAN COMPANY

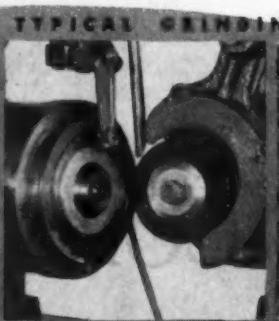
TYPICAL GRINDING OPERATIONS



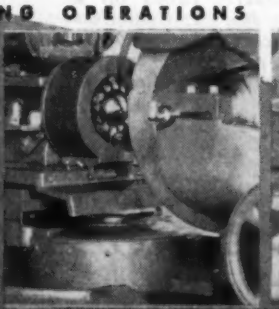
External grinding of inner race



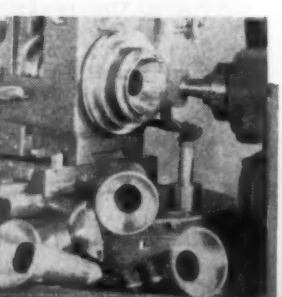
Internal grinding of outer race



Grinding a worm bearing

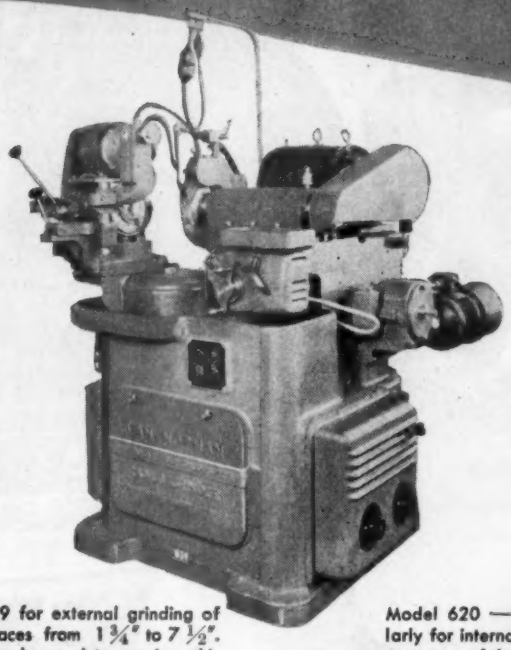


Grinding spherical swivel cap

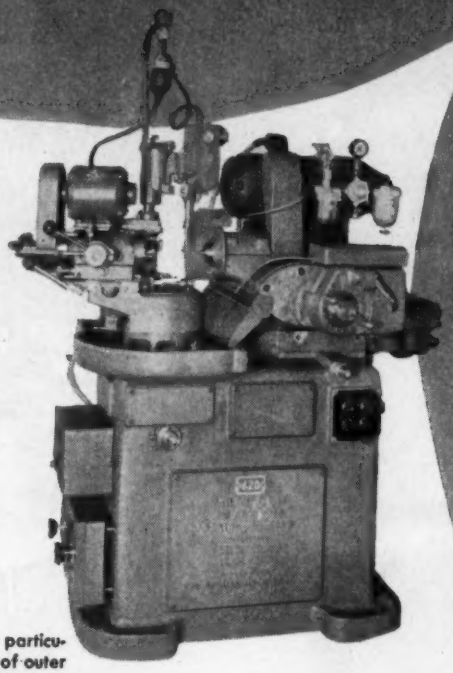


Grinding spherical bearing surface in automotive part

AND SPHERICAL GRINDING...



No. 639 for external grinding of inner races from 1 ¾" to 7 ½". Built for heavy-duty service, this model is capable of performing a wide range of grinding operations at high production rates.



Model 620 — Designed particularly for internal grinding of outer raceways of the smallest sizes and up to 204 size. Supplied with a motorized workhead providing high speed workhead spindle.

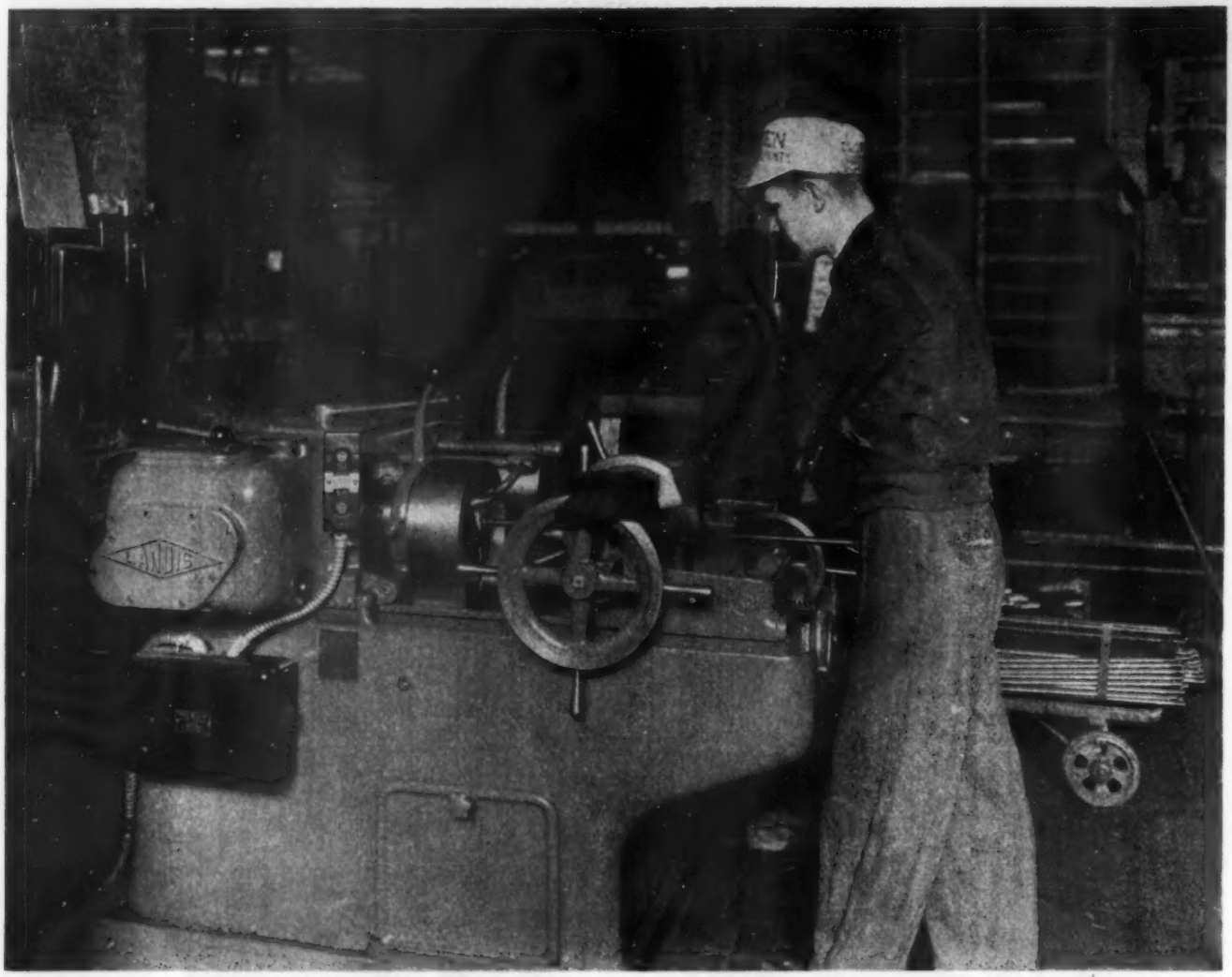
No. 648 Van Norman Grinder for external grinding of large diameter inner races from 6" to 16".

No. 673 Van Norman Radius Grinder for internal grinding of outer races from 1 ¾" to 7 ½".

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

"It pays to Van Normanize"



An All-Purpose Threading Machine . . . . . The LANDMACO

The Landmaco Threading Machine here illustrated is a general purpose machine. The thoroughly modern design, which permits quick set-up changes, makes it ideal for the short production run of tie-rods, a single rod for maintenance or a rush call for some special-threaded parts.

Its high operating speed assures unusual production figures in threading tough alloy steel jobs to close tolerances or in cutting the average commercial threads used in construction, reclamation and maintenance.

The Landmaco Threading Machine is accurate, fast, dependable and will handle all demands with a minimum of delay.

Write for Bulletin H-75

LANDIS MACHINE COMPANY

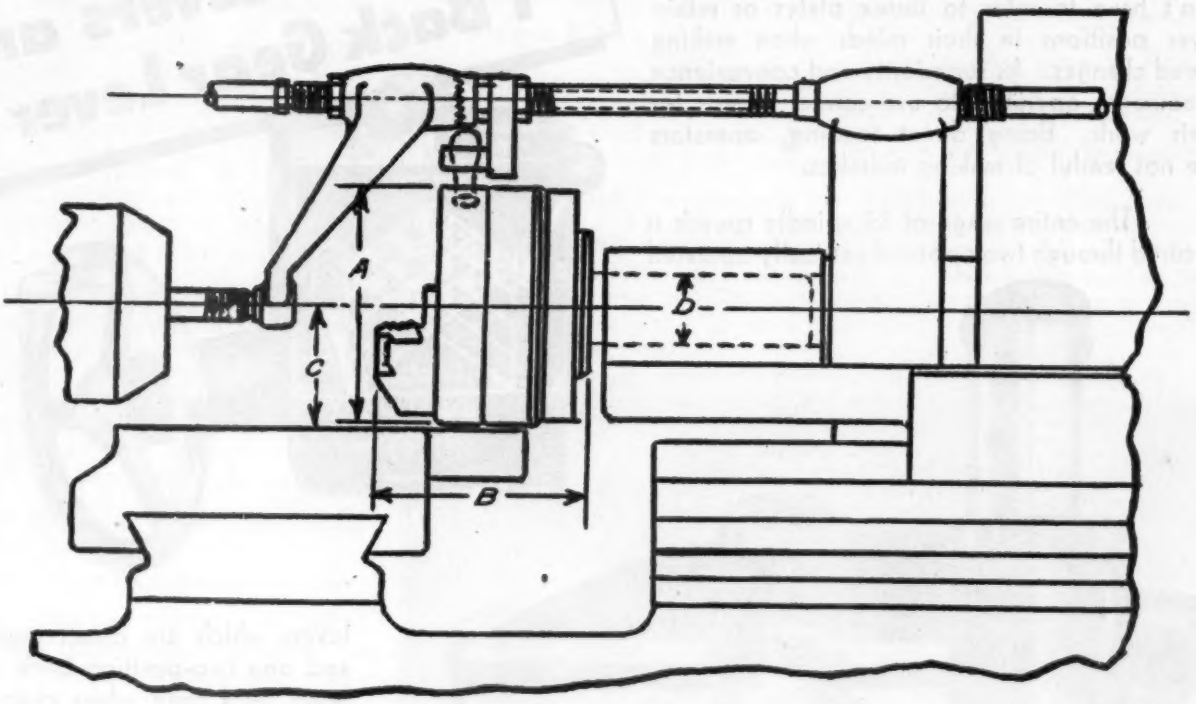
A Good Mechanic Knows and Cares For His Machine

LANDIS REG. U.S. TRADE—MARK PAT. OFF.

THREAD TIPS

In the Interest of Efficiency, Better Workmanship and Higher Production

Application of LANDMATIC Heads to Cleveland Model "B" Automatic Machines



MODEL "B" MACHINES

RATED CHUCK CAPACITY	3/8	7/8	1-1/4 - 12	1-1/2	1-1/2 - 18	2	2 - 18
CLEARANCE "C"	1-5/16	2-1/4	2-5/8	2-5/8	3-1/2	2-5/8	3-1/2
SIZE DIE HEAD		7/8	1-1/4	1-1/4	2	1-1/4	2
DIAMETER OF HEAD "A"		3-15/16	5-1/8	5-1/8	6-15/16	5-1/8	6-15/16
LENGTH OF HEAD "B"		3-13/16	5	5	6-7/32	5	6-7/32
DIAMETER OF SHANK "D"		1-1/16	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2

NOTE:—DIAMETER AND LENGTH OF SHANK MUST BE SPECIFIED AS THE BORE IN THE SHANK HOLDERS VARIES IN SIZE.

Be Threadwise—Employ LANDIS Long Life Tangential Chasers

WAYNESBORO, PENNSYLVANIA, U.S.A.

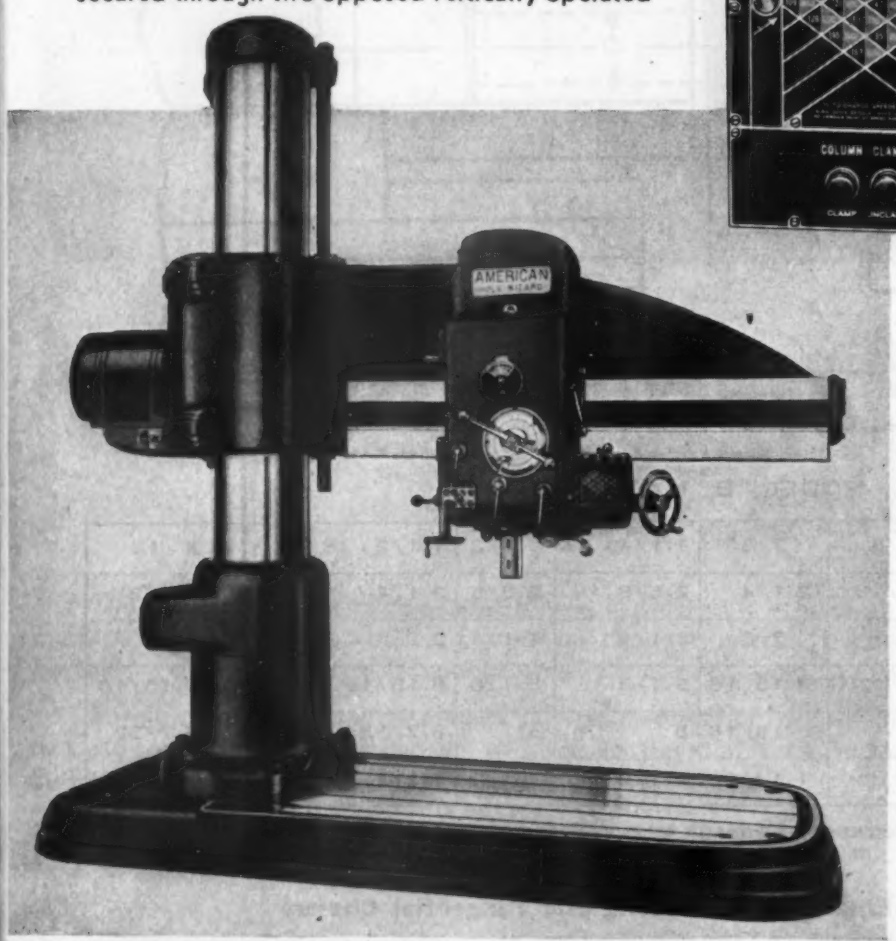
THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

32 SPINDLE SPEEDS

...with only 2 Control Levers and 1 Back Gear Lever

Operators are enthusiastic in their praise of this new direct reading speed control. They don't have to refer to index plates or retain lever positions in their minds when making speed changes. Its superiority and convenience encourages operators to use correct speeds for their work. Being direct reading, operators are not fearful of making mistakes.

The entire range of 32 spindle speeds is secured through two opposed vertically operated levers which are direct reading and one two-position back gear lever used only when changing from the high to the low speed range or vice versa.



This new speed control makes work easier; increases production because of it and the payroll dollar buys more as a consequence.

This and other fine features of the "American" Hole Wizard Radial Drill are thoroughly illustrated and described by Bulletin No. 326.

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

Lathes and Radial Drills

It is reported that . . . . . .

A recent survey shows that 89% of the tire and rubber companies and 86% of the paper companies will have new products to offer after the war. 58% of all manufacturers questioned have something entirely new for post-war customers.

get ready with **CONE** for tomorrow

A new heat-treated glass is in production that resists thermal shock and temperatures to 650° F.

get ready with **CONE** for tomorrow

One of the large tire manufacturers has just patented a tubeless, uninflated automobile tire.

get ready with **CONE** for tomorrow

Bimetallic cylinders for internal combustion engines, in which a copper sleeve is bonded to a cast iron cylinder, promise to lessen greatly the problem of heat transfer that has always interfered with high performance.

get ready with **CONE** for tomorrow

Indium, once worth $20,000 an ounce, now costs $7.50.

get ready with **CONE** for tomorrow

A plant has just been opened to rebuild completely automobiles by the production line method to new car standards.

get ready with **CONE** for tomorrow

Aircraft engineers imagine that the big airlines of the future will dispense with landing gear entirely and will be electronically guided into a wheeled cradle at each landing field.

get ready with **CONE** for tomorrow

The same type of mechanism now used to stabilize the guns of moving tanks could be used to provide smoother riding trains.

get ready with **CONE** for tomorrow

Foam rubber is expected to replace familiar upholstery construction in automobile seats, saving nearly a foot in the length of the body.

get ready with **CONE** for tomorrow

One big national picture magazine plans to print entirely in full color after the war.

Factory roofs actually supported solely by air blast from ventilating fans are in use and are the subject of serious experiment.

get ready with **CONE** for tomorrow

Snap-on molded rubber covers are now being used to mask those parts of electro-plated objects which must remain bare.

get ready with **CONE** for tomorrow

San Francisco has a plan for a 25 million dollar "World Trade Center" covering twelve blocks of its water front and including a free trade zone.

get ready with **CONE** for tomorrow

Glass jewels, for instrument bearings, can now be turned out automatically at the rate of 3,500 per day. They are preferable in some respects to natural sapphires.

Through careful research and improvement, one familiar office machine has had 94 per cent of its noise eliminated or absorbed.

get ready with **CONE** for tomorrow

Electrically conductive rubber is being used to heat aircraft guns and propellers.

get ready with **CONE** for tomorrow

By the use of a resin extracted from Southern pine, foundries have been able to reclaim old sand and reduce their consumption of new sand as much as 75 per cent.

get ready with **CONE** for tomorrow

A new filtering material, made of pure rubber latex, has as many as 6,400 holes to the square inch.

get ready with **CONE** for tomorrow

A new adhesive bonds wood to metal, making possible a new product consisting of a 1/48" ply of wood combined with a thin layer of sheet steel. This material can be readily cut and bent, and is decorative, durable, and fireproof.

LANDIS OFFERS YOU 36 YEARS OF CAM GRINDING EXPERIENCE

LANDIS TOOL

Precision Grinders

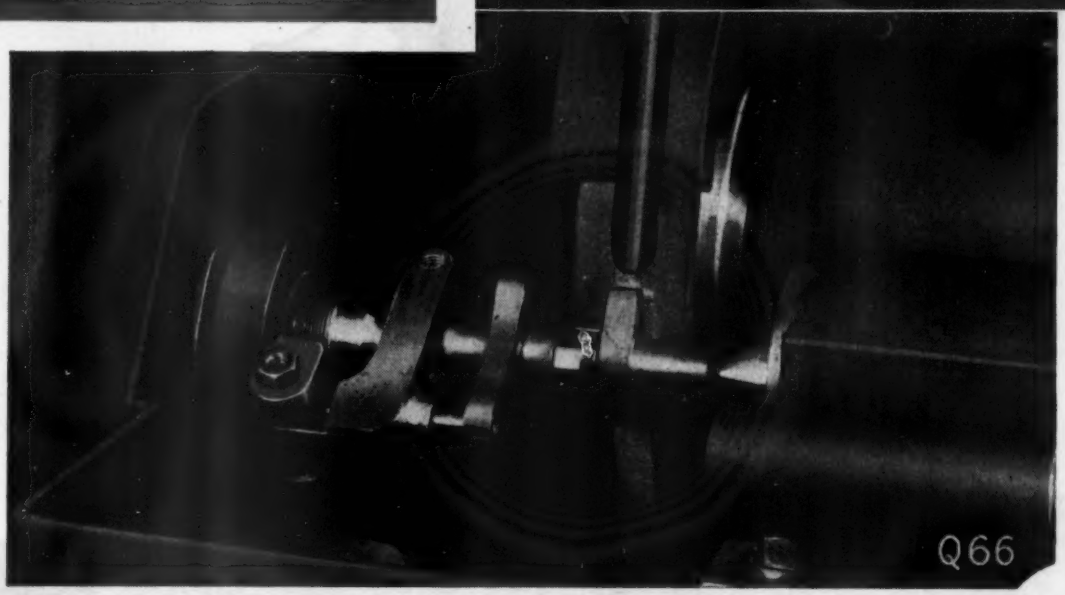
For the last several years the necessity for cam production has been at an all-time record high. Landis has contributed largely to this demand.

The accompanying illustrations show the grinding of several types of cams on Landis equipment. Fig. Q-25—A DISTRIBUTOR CAM is being ground. Figs. Q-63 and Q-64

LANDIS TOOL COMPANY

CAMS · CAMS
AND
MORE CAMS

ake their appointed places
in the mechanisms
of Victory



how the grinding of a CAM for PROPEL-ER PITCH CONTROL; Fig. Q-66 a FUEL NJECTOR CAM being ground. All of these ams are used in mechanisms of Victory.

Why not bring your cam grinding prob-ems to Landis Tool? You are sure to profit rom our long experience in the grinding achine field.

443-R

PRECISION GRINDERS
LANDIS TOOL
SINCE 1890
UNIVERSAL RECOGNITION

LANDIS TOOL *Company*

WAYNESBORO · · · PA.

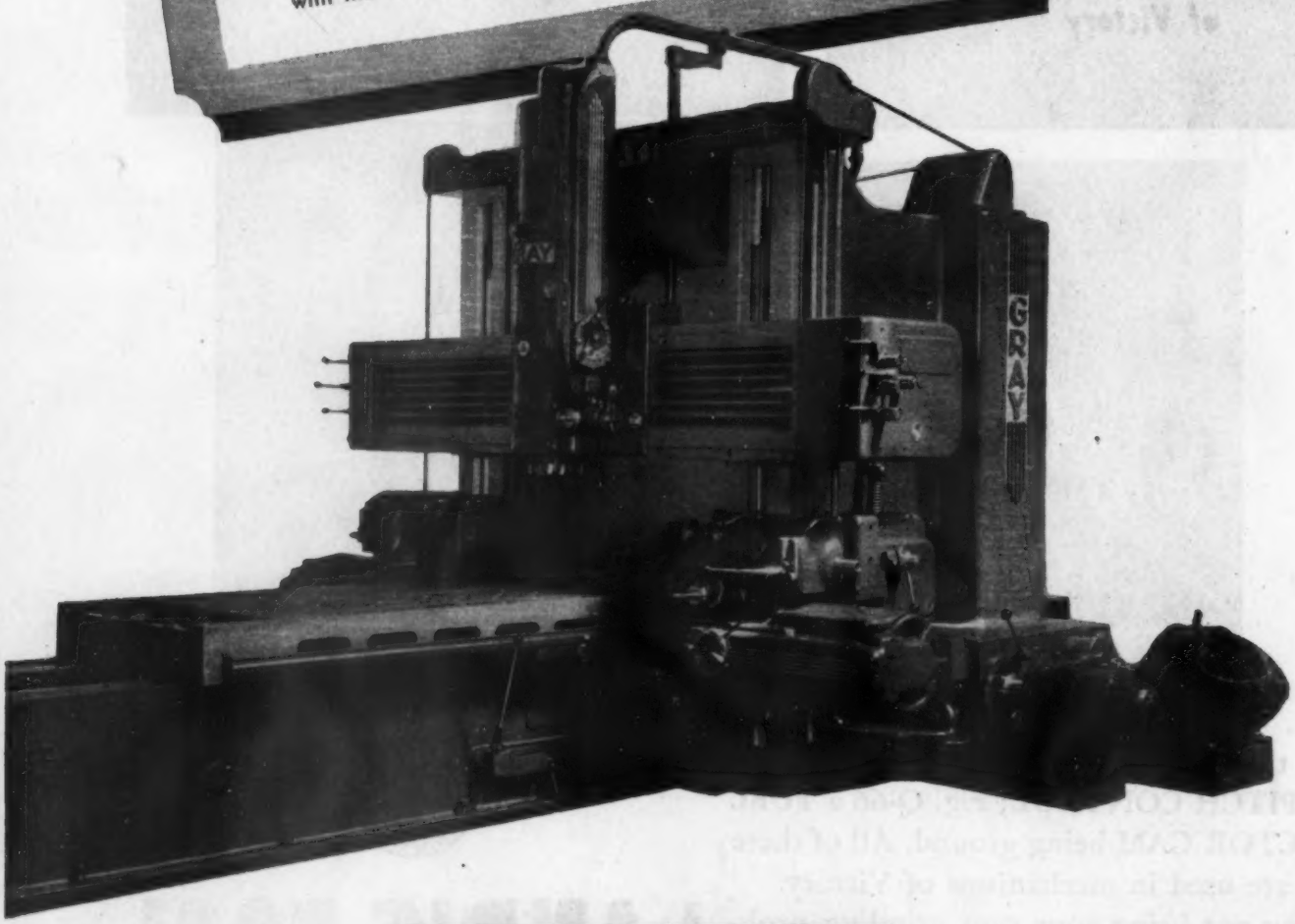
THE MACHINE OF TODAY FOR THE JOBS OF TOMORROW

The Gray Milling Machine departs from the conventional milling machine in design and construction offering unusual speed—flexibility and accuracy of production.

One of its many important features is the Stub Shaft, Spiral Geared Drive. This drive provides enduring smoothness of motion with minimum torsional wind-up and is self locking under all conditions.

It furnishes a smooth, powerful table drive of exceptional rigidity. Ten teeth of the table rack are always in contact with the driving gear.

ARMY E NAVY



GRAY

THE G. A. COMPANY

Cincinnati 7 Ohio, U. S. A.

THE GRAY LINE—Double Housing and Openside Planers, Switch Planers, Die Block Planers, Double-Housing and Openside Milling Planers, Planer Type Milling Machines, Horizontal Boring Machines.

METRO

As Craftsman to Craftsman

Because Metro Gages and Carbide Tipped Tools (whether standard or designed for a special job) are the product of skilled craftsmanship based upon careful engineering and long experience—*you* find that your own craftsmanship can rely fully upon their dependable precision in all operations where their use is called for.

ARMY E NAVY

Write for New Metro Catalog No. 102

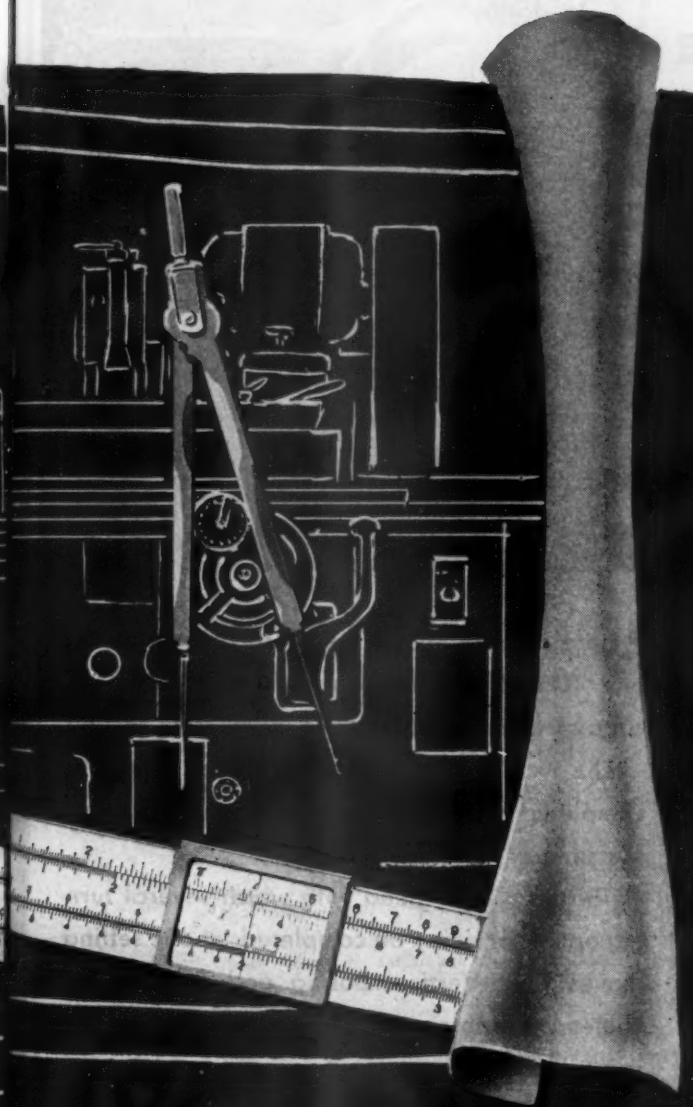
Metro Standard Gages and Carbide Tipped Tools are immediately available through your METRO distributor.

METRO TOOL AND GAGE CO.

4240 Peterson Avenue
Chicago 30, Illinois

DESIGNED
FOR
TOMORROW

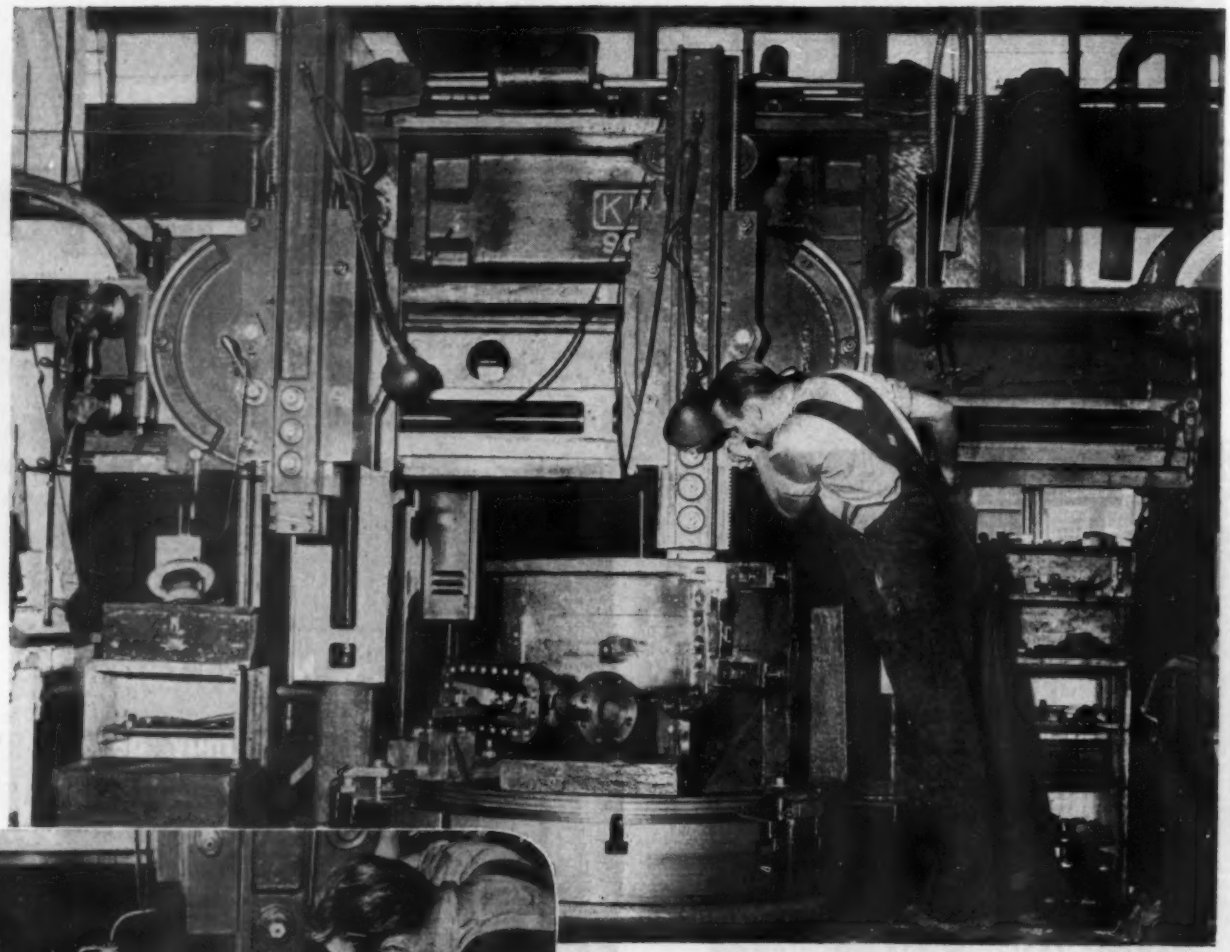
PRODUCTION CAM GRINDING UNITS for NORTON CYLINDRICAL MACHINES



The new Norton Cam Grinding Units may be placed directly on the standard 6" and 10" Type C Grinders - - - ready then to go into immediate high production.

NORTON COMPANY
WORCESTER 6, MASS.

M 491



KING

Vertical Boring Mill

grooving high pressure cylinder for turbo generator

● Here the rigidity of the King Vertical Boring and Turning Machine enables the operator to cut a clean, accurate groove in this steel casting.

The turning and facing operations were also completed on this 72 inch Boring and Turning Machine at the same setting.

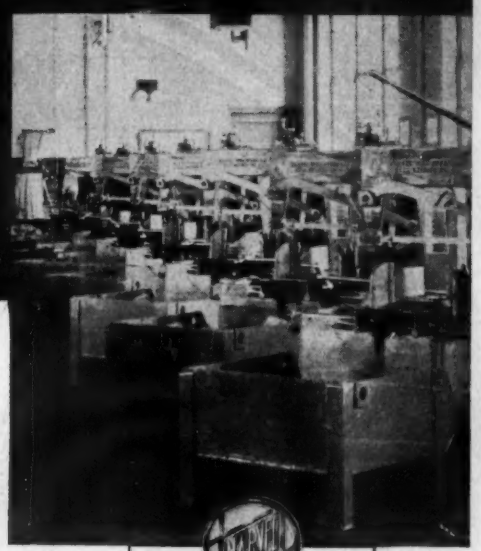
The ease and speed with which several turning operations may be completed, at one setting, makes King Vertical Boring and Turning Machines profitable units for a host of shops now using them.

For speed—ease of operation and ultimate economy put your next boring mill job on a King.

KING BUILDS Vertical Boring and Turning Machines exclusively in single column types from 30" to 42"—double column types up to 12 feet.

THE KING MACHINE TOOL COMPANY
CINCINNATI 32, OHIO

BUILDERS OF VERTICAL BORING AND TURNING MACHINES EXCLUSIVELY

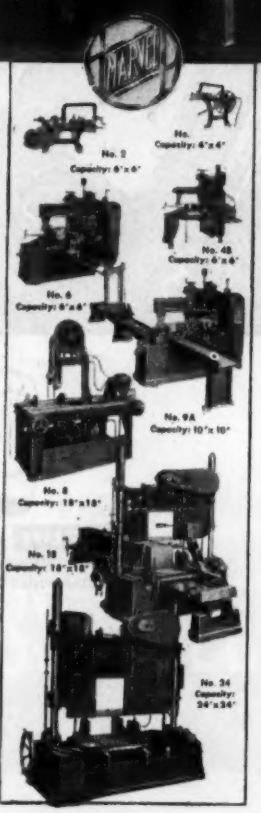


Where Speed Counts *Most!*

Increased steel production and more rigid inspection during the war has made it necessary for metallurgical laboratories to require hack saw machinery for specimen cutting of a wide variety of metals and alloys of almost any shape or size — in any condition of hardness.

The photos shown here illustrate how one large steel mill in the middle west has installed a battery of Marvel Hack Sawing Machines to crop and cut-off slices for metallurgical tests of large billets of tough alloy steels. This company, along with many other steel companies, has found that the Marvel Machine is the only one capable of cutting the hardest alloys fast and economically. The Marvel is the most universal cutting-off machine, built for heavy duty, continuous operation.

Marvel Saws increase production by rapidly, accurately and economically cutting-off the toughest steels in cross sections up to 24" x 24". If you have metal sawing problems, Marvel Sawing engineers are available to discuss and analyze your cut-off work—to recommend methods and equipment.



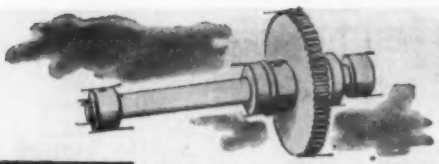
ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 W. BLOOMINGDALE AVE. CHICAGO 39, U.S.A.

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

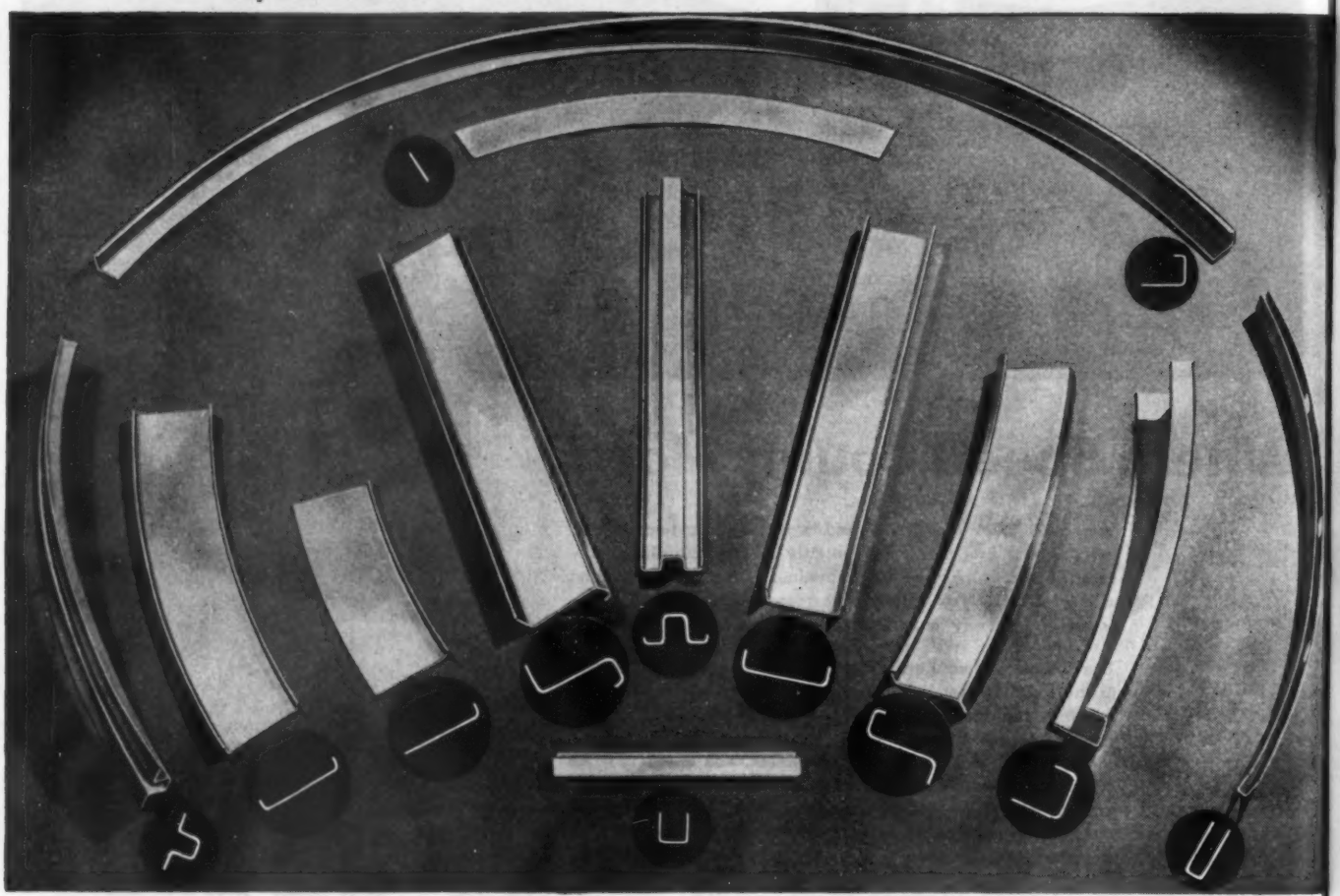
MARVEL SAWS

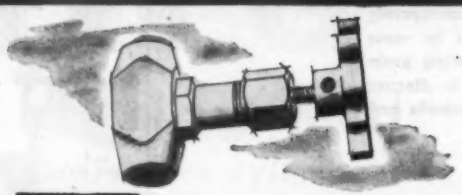


UNIFORMITY High tensile strength plus hair-line machining was required on this job. Mass production was made possible with unusual close and uniform tolerance Carpenter Stainless bars.

You Get CORROSION RESISTANCE...

LOW UNIT COST To gain sales appeal yet keep price competitive, kitchen implements, like the egg beater shown above, gain distinct advantages when made from Carpenter Stainless Steel.





LONG LIFE Valves made from Carpenter Stainless provide resistance to corrosion from a wide range of chemicals and withstand heat, pressure and wear.

DESIGN FLEXIBILITY These shapes illustrate what you can do with easy-to-fabricate Carpenter Stainless Strip. Lighter gauges and sharper radii are possible with this versatile metal. The life of the product you are designing now can be lengthened, its sales appeal enhanced, by making it from bright, uniform Carpenter Stainless Steels.

EYE APPEAL Unusual eye-catching designs captured in sparkling Stainless! It's easy when you specify Carpenter! For this Stainless trim a light gauge was used without sacrifice of strength and rigidity.

Plus these

NEW DESIGN POSSIBILITIES

with Carpenter Stainless!

That gleam in your designer's eye probably means one thing: you're planning to launch some exciting new or redesigned product in the postwar market.

Very likely Stainless Steel will feature in your plans—for Stainless not only provides resistance to corrosion, heat and wear, but high strength/weight ratio, special physicals, and gleaming surface finishes that stay everlastingly bright.

As the pioneer in the development of Stainless Steels, and inventor of Free-Machining Stainless Steels, we'd like to apply our diversified peacetime and wartime experience to help solve your specific Stainless problems.

There are three ways you can benefit by working with Carpenter in your postwar planning:

1. By starting with Carpenter Stainless Steels, which through rigid controls in manufacture, can be counted on to have the same uniform fabricating qualities, lot after lot.

2. Through a service program which aims to help Stainless users select the analysis that will best meet the particular fabrication, corrosion, and physical requirements.

3. By taking advantage of Carpenter metallurgical and engineering assistance in solving new and different problems of fabrication. This helps prevent trouble *before it starts,* speeds production, and reduces fabricating costs.

Take the first step to secure this helpful Stainless design-engineering cooperation by calling in your nearby Carpenter representative. Talk over your problems with him—get the benefit of his long Stainless experience. If you have not already received a copy of our 98-page book, "Working Data for Carpenter Stainless Steels," drop us a line on your company letterhead indicating your title.

Give Your Product These Advantages

- Sales Appeal
- Everlasting Beauty
- Freedom from Rust
- No Plating to Peel
- Weight Saving
- Strength and Rigidity
- Ease of Assembly
- Fewer Service Complaints

THE CARPENTER STEEL COMPANY, 109 W. BERN ST., READING, PA.

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

REED-PRENTICE

No. 4 VERTICAL MILLER

Close-up of a No. 4 Miller installation with single duplicator in die sinking operation.

Reed-Prentice No. 4 Vertical Miller with dual duplicating attachment.

. . . . with Dual or Single Duplicating Attachment.

In construction and control of operation, the Reed-Prentice No. 4 Vertical Miller represents exceptional engineering achievement. The capacity and precision of this Miller with single or dual duplicating attachment has accumulated outstanding records of performance both for milling and die sinking. The No. 4 Miller ranks high in modern machine tool development.

The Reed-Prentice No. 4 Vertical Miller is also adaptable for negative rake milling. Particulars supplied on request.

ARMY-NAVY

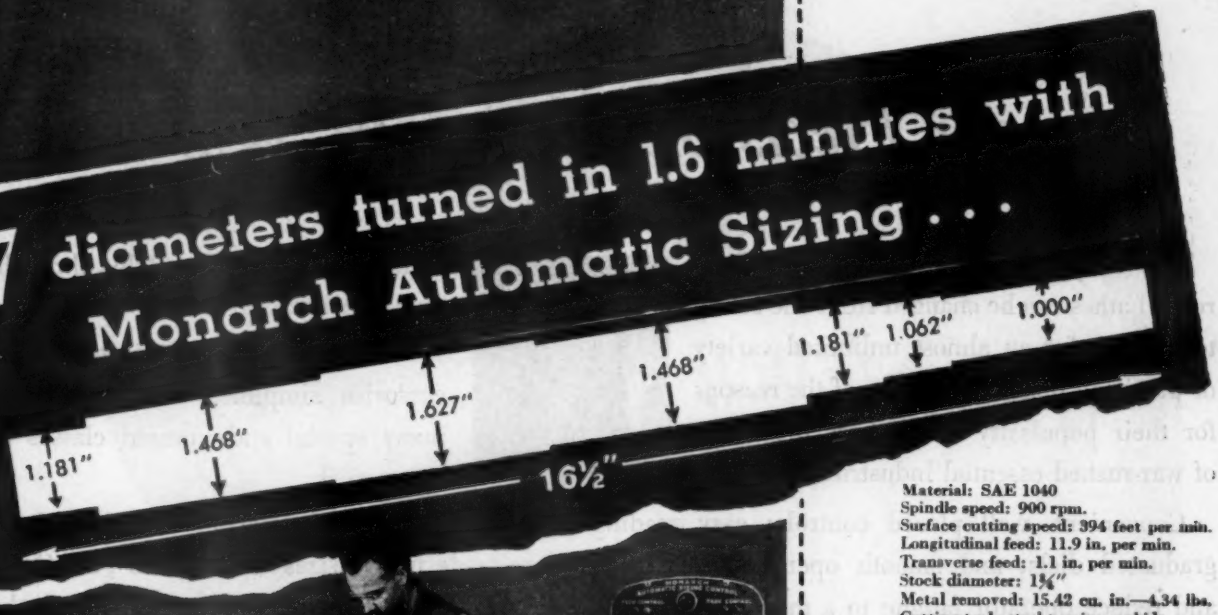
MACHINE TOOLS

REED-PRENTICE CORP.

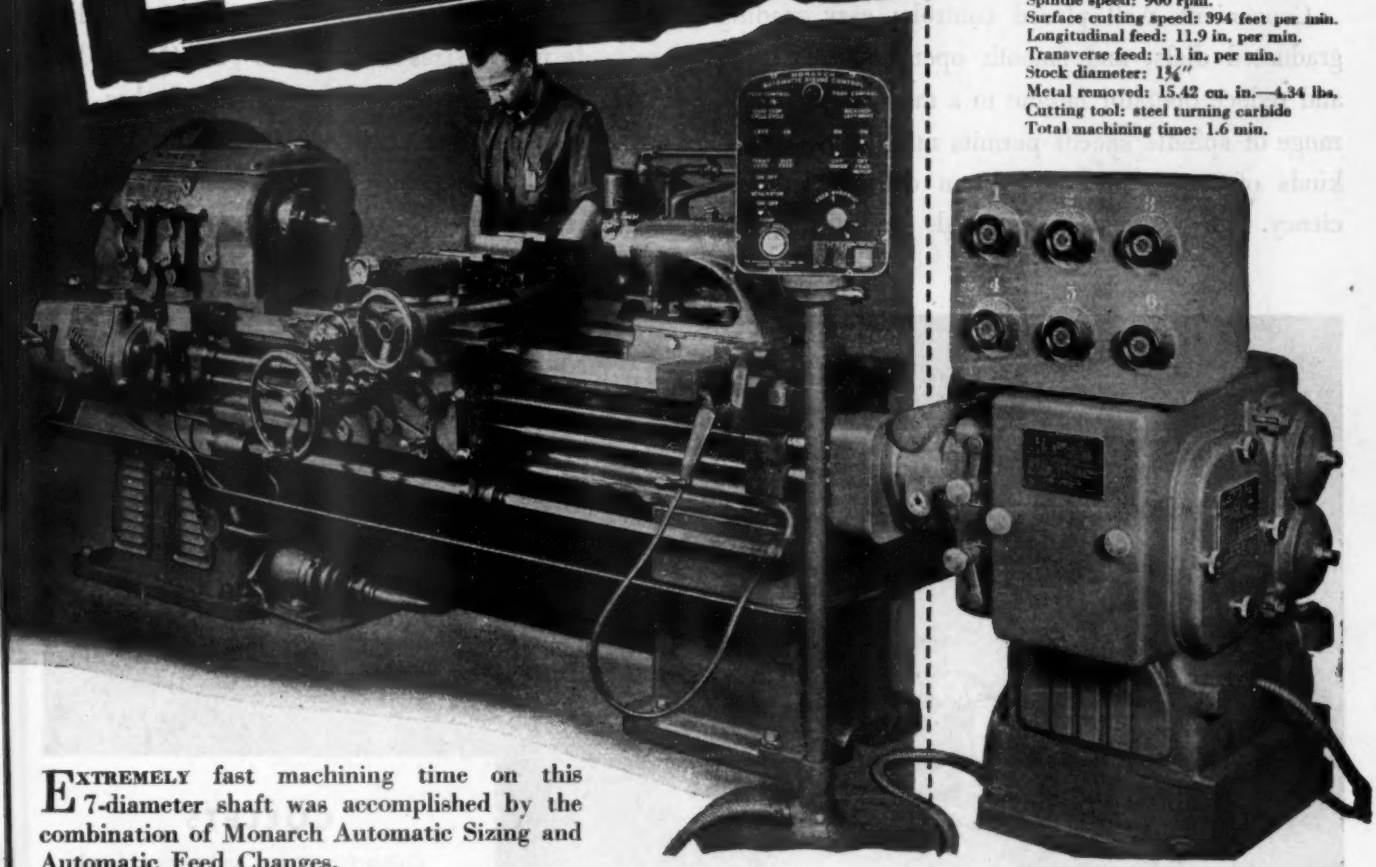
WORCESTER MASS., U.S.A.

NEW YORK OFFICE
75 West St.
New York 6, N. Y.
CLEVELAND OFFICE
1213 W. 3rd St.
Cleveland 13, Ohio

7 diameters turned in 1.6 minutes with Monarch Automatic Sizing . . .



Material: SAE 1040
Spindle speed: 900 rpm.
Surface cutting speed: 394 feet per min.
Longitudinal feed: 11.9 in. per min.
Transverse feed: 1.1 in. per min.
Stock diameter: 1¾"
Metal removed: 15.42 cu. in.—4.34 lbs.
Cutting tool: steel turning carbide
Total machining time: 1.6 min.



EXTREMELY fast machining time on this 7-diameter shaft was accomplished by the combination of Monarch Automatic Sizing and Automatic Feed Changes.

The various lengths and diameters are automatically controlled by a thin metal template which governs the length feed through the lead-screw and the cross feed through the feed rod of the lathe. The panel on the pedestal houses the electric controls, and is always placed close to the operator.

The cabinet at the right contains the Automatic Feed Change mechanism. By this device, feed rates are automatically changed according to the varying diameters or varying depths of cut to remove continually the maximum amount of metal on each diameter. The mechanism may be instantly disconnected when constant feeding rates are desired.

Since setup time is relatively low, important time savings are gained even on small runs, magnified, of course, for quantity production. Monarch engineers will gladly give you details of how Automatic Sizing with Automatic Feed Changes may be applied to your present or postwar work.

THE MONARCH MACHINE TOOL CO. • SIDNEY, O.

DIRECT FACTORY BRANCHES:

801 Fisher Bldg., Detroit 2, Mich.
10465 Carnegie Ave., Cleveland 6, Ohio
622 W. Washington Blvd., Chicago 6, Ill.
1060 Broad Street, Newark 2, N. J.
512 Empire Bldg., Pittsburgh 22, Pa.
Representatives in principal cities

Monarch Saves Time

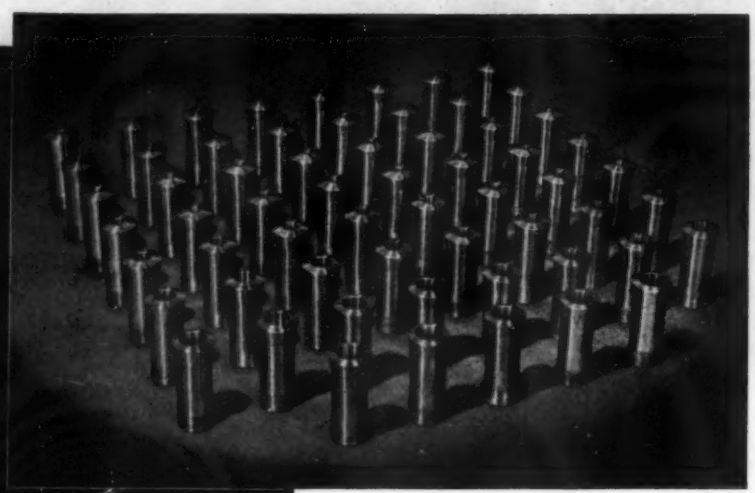
Versatility
for Precision Toolroom Work

The ease with which South Bend Toolroom Lathes can be changed from one set-up to another for an almost unlimited variety of precision operations is one of the reasons for their popularity in the busy toolrooms of war-rushed essential industries.

Convenient, well placed controls; easy reading graduated dials; and smooth operation save time and reduce operator fatigue to a minimum. A wide range of spindle speeds permits machining various kinds of metals with maximum cutting tool efficiency. Threads and power feeds for all requirements are instantly available through a full quick change gear mechanism.

A complete line of attachments and accessories simplifies tooling the lathe for many special and unusual classes of toolroom work.

South Bend Toolroom Lathes and Engine Lathes are made in five sizes: 9″, 10″, 13″, 14½″, and 16″ swing respectively. Precision Turret Lathes are available in two sizes: Series 900 with 9″ swing and ½″ collet capacity and Series 1000 with 10″ swing and 1″ collet capacity. Write for catalog.



COLLETS

Collets for all sizes and types of South Bend Lathes are now being shipped directly from stock. All sizes from 1/16″ to 1″ diameter in steps of 1/64″ are available.

A complete set of collets is especially helpful in toolroom and maintenance work. Often the time saved by having on hand the right size collet for a single rush job will more than compensate for the cost of a full set of these fine collets.

Check your collet requirements today—for toolroom, maintenance, and production work—and order all you need. Specify size and serial number of lathe.

Buy War Bonds—Save For Lathes

SOUTH BEND LATHE WORKS

SOUTH BEND 22, INDIANA • LATHE BUILDERS FOR 37 YEARS

For the Toughest Jobs

Marathon 850-A Cutting Oil is precision compounded to measure up to the most exacting specifications for difficult, heavy-duty work . . . particularly deep drilling, tapping and threading.

It's the cutting oil you can count on to take over those extra-heavy jobs that are just too much for a general purpose cutting oil. Marathon 850-A flows freely to the point of contact (just the right viscosity) and absorbs and dissipates heat rapidly.

Balanced sulphur content increases its anti-weld characteristics. Smoke is reduced to a minimum or eliminated entirely. And, most important, the plants now using Marathon 850-A Cutting Oil report no sludging, longer tool life and better finish.

A Marathon lubrication engineer will be glad to give you further information on Marathon 850-A Cutting Oil for other jobs in your plant . . . and show you convincing evidence that this oil more than matches performance demands on extremely heavy-duty work. Write, wire or phone . . . ask an engineer to call.

A COMPLETE LINE OF CUTTING AND GRINDING OILS FOR EVERY METAL WORKING OPERATION

MARATHON

The OHIO OIL Company

GENERAL OFFICES: FINDLAY, OHIO

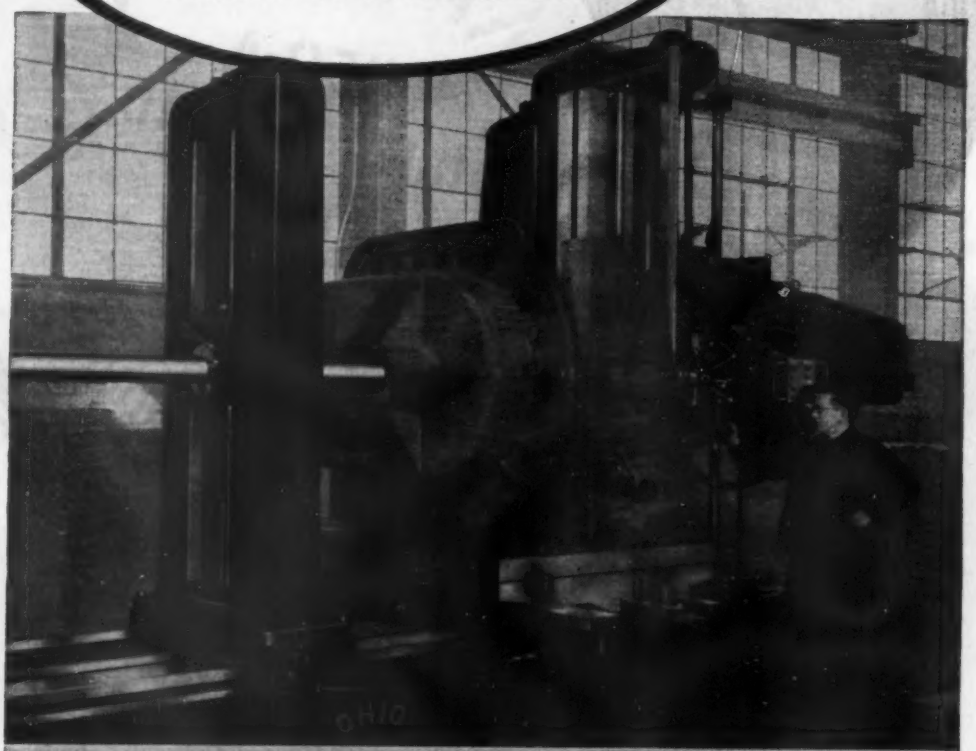
District Offices: Robinson, Ill., Indianapolis, Ind., Louisville, Ky.

PRODUCERS OF PETROLEUM SINCE 1887

Orders for Ohio Horizontals are being shipped with reasonable promptness.

OHIO HORIZONTAL

BORING, DRILLING AND MILLING MACHINES



The accurate boring of large steel castings is facilitated on this Ohio Horizontal 5T-43A Table Type Machine by the sturdy boring bar support.

Ohio Horizontals have earned a name for accuracy, power and ease of handling. Such features as the following have made them standard equipment in many of the country's largest steel mills, shipyards, arsenals and heavy machinery producing plants:

(1.) Nitrided spindle; (2.) Anti-friction bearings throughout; (3.) Automatic lubrication; (4.) Built-in electrical power rapid traverse with push-button control; (5.) Narrow-guide construction for all moving units; (6.) Push-button control for start-stop, forward-reverse and run-jog of the spindle; (7.) Pressure lubrication to all sliding surfaces; (8.) Unit construction, providing accessibility to all units; (9.) Multiple-splined shafts with splines milled from the solid for sliding gears and clutches; (10.) All mechanical clutches of the internal gear tooth type.

Ask for complete, well illustrated Bulletin

THE OHIO MACHINE TOOL CO. • KENTON, OHIO

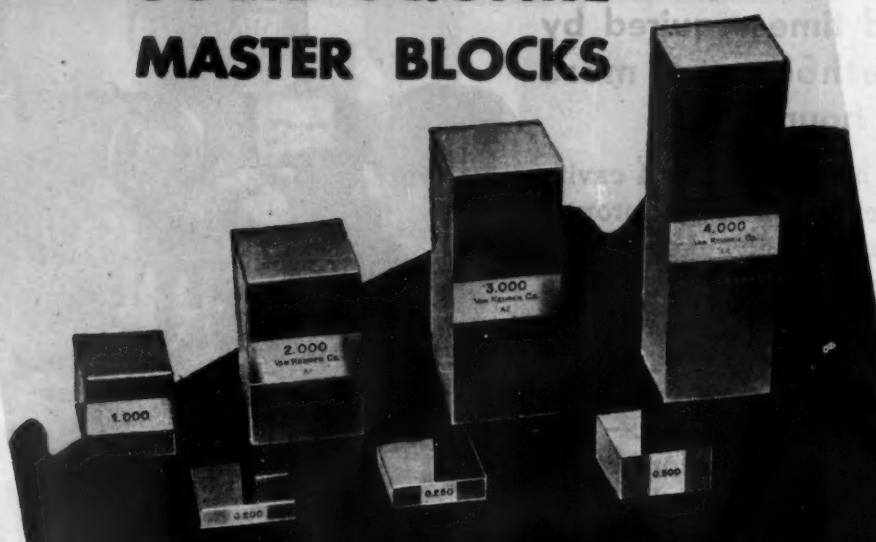
OHIO'S STEP UP PRODUCTION

OHIO DREADNAUGHT

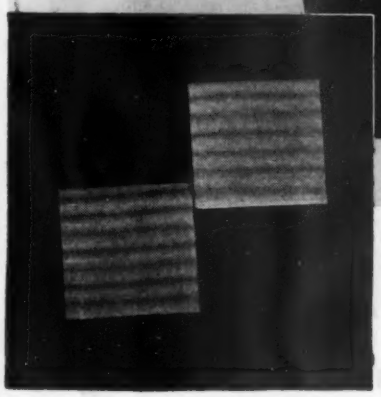
HORIZONTAL BORING, DRILLING AND MILLING MACHINES • SHAPERS • PLANERS

Van Keuren

SOLID SQUARE MASTER BLOCKS



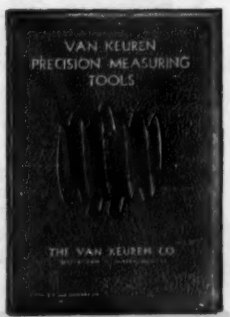
The Perfect Reference Standard For Your Post War Requirements



Comparison of two Solid Square Master Blocks for length, flatness, and parallelism with light waves. Note the straightness, parallelism, and even spacing of the bands on both blocks showing perfection well within the guaranteed accuracy of 4 millionths of an inch. These blocks are ideal standards for making measurements with light waves.

The perfect gage block should be square in order to obtain stability and the best distribution of wearing surface. It should be solid in order to have uninterrupted flat and parallel measuring surfaces. The material should be steel, the best obtainable, in order to secure proper expansion characteristics, maximum wearing qualities, resistance to corrosion, and permanency. These requirements are fulfilled in Van Keuren solid square master blocks. They have six times the life of ordinary blocks and are as nearly perfect as 25 years of experience in manufacturing gage blocks can make them.

A limited number of 41 and 84-block sets are available for quick shipment. Ask for prices and delivery dates. Send for new 144-page Van Keuren Handbook No. 32.



Van Keuren CO., 176 WALTHAM ST., WATERTOWN, MASS.

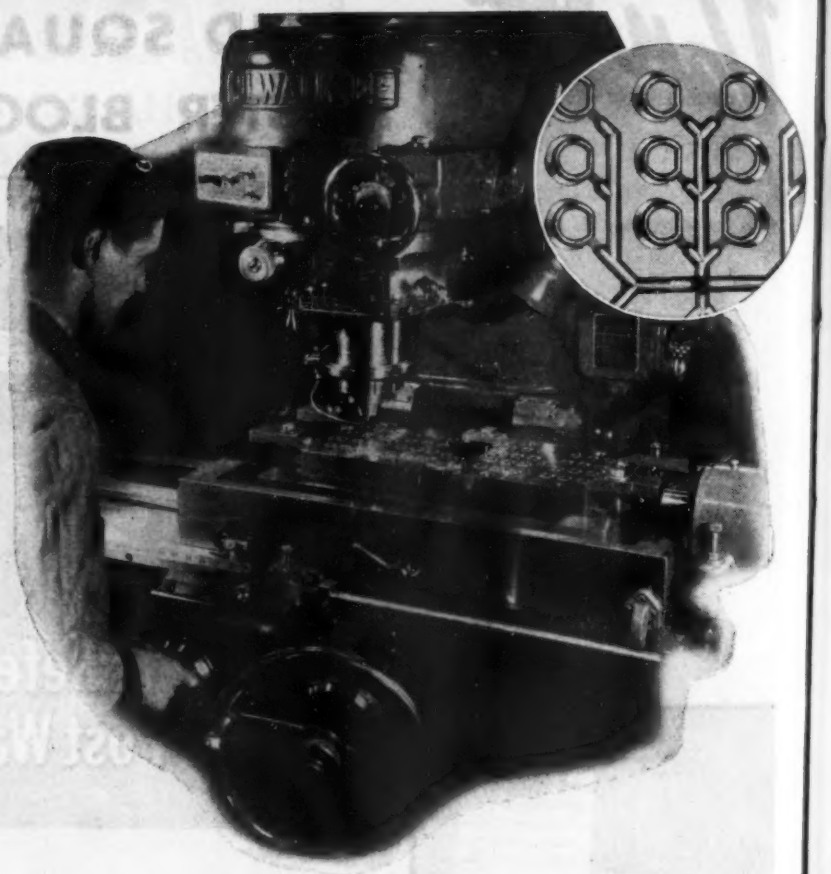
25th YEAR

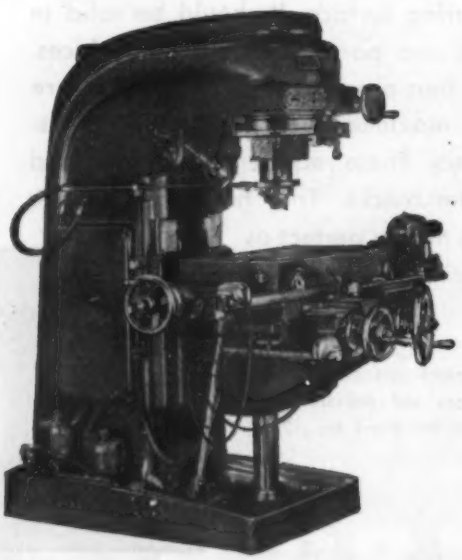
Light Wave Equipment—Light Wave Micrometers—Gage Blocks—Taper Insert Plug Gages—Wire Type Plug Gages—Measuring Wires—Thread Measuring Wires—Gear Measuring System—Shop Triangles.

24 CAVITY MOLD FINISHED IN *18* HOURS!

Estimated time required by other methods was more than 100 hours!

THE two halves of the 24 cavity mold were aligned and properly spaced on the Milwaukee Rotary-Head Milling Machine table. The first milling operation was performed on the first cavity in the back row. Then, by moving the table the proper distance — the same operation was performed on the next cavity. Since the cavities in the two mold halves were identical, this and succeeding operations were simply carried over to the opposite half of the mold. Each operation was readily performed in proper sequence and the entire 48 impressions of the 24 cavity mold were machined completely at a single set-up in 18 hours.





KEARNEY & TRECKER'S
ROTARY HEAD MILLER

The Most Versatile Machine Ever Designed for Mold and Die Work

DIRECT . . . mills mold cavities in a single set-up without the aid of templets or models.

ACCURATE . . . chances for error are eliminated because there is no change in set-up. Exact control of all combinations of cutting movements—possible only with this machine—transmits mathematical precision to the work.

FAST . . . initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of intricate molds and dies is the result.

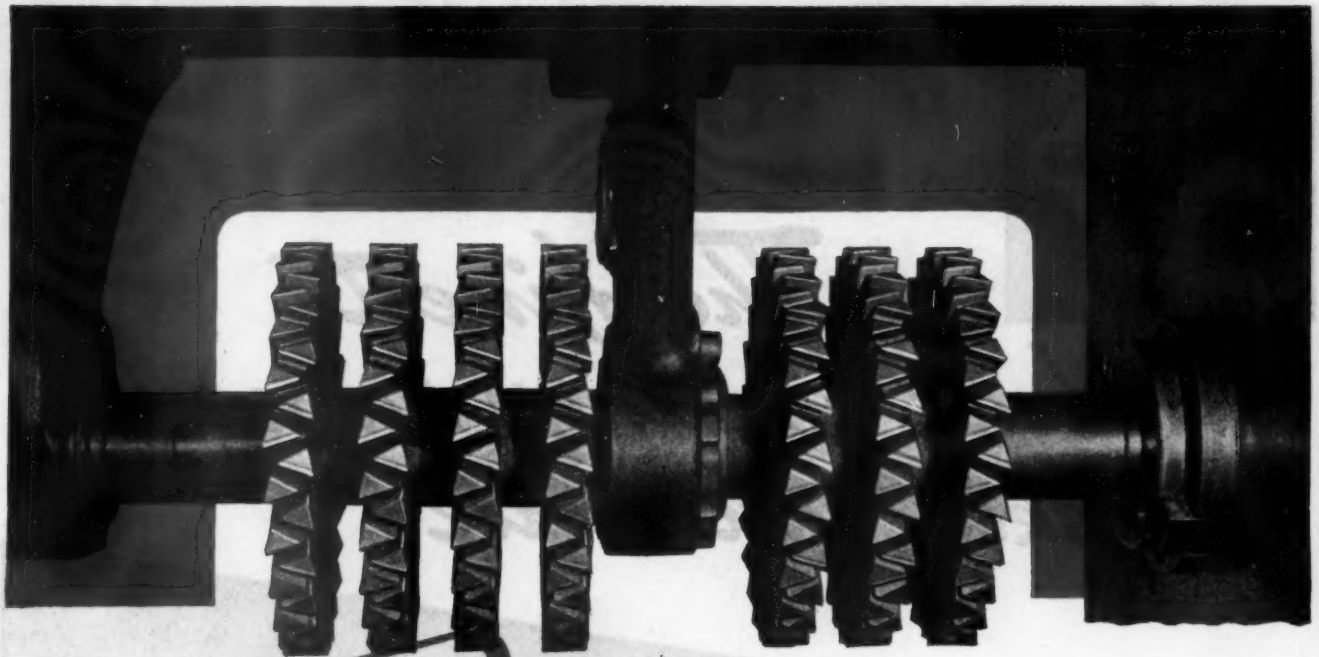
•

Write for bulletin No. 1002C for complete information on the Milwaukee Rotary-Head Miller and the accurate and rapid production of all types of molds and dies for plastics.

Rotary Head Milling Machine
•
Autometric Jig Borers
•
Center Scope

Kearney & Trecker *Products*
CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
•
Milwaukee Midgetmill
•
Milwaukee Speedmill



ANOTHER EXAMPLE OF
BARBER-COLMAN
CUTTER PERFORMANCE

B-C HERRINGBONE CUTTERS SOLVE DIFFICULT MILLING PROBLEM

Above, cast steel brake shoe, showing slots to be milled in both ends. Below, sequence fixture used on this job.

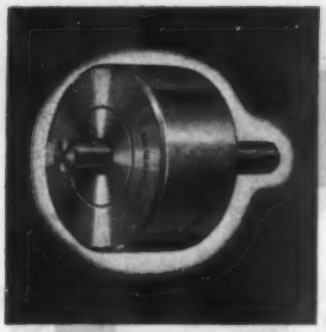
Trouble on this job was caused by irregular *very hard spots* in the castings; so hard and so many that previous cutters shed teeth all too frequently — *until they put on this gang of Barber-Colman Herringbone Type Cutters shown above.* These pieces are cast steel brake shoes, with 3 slots to be milled in one end and 4 in the other. The fixture used is shown below. Each slot is 27/32″ wide and 1-3/4″ deep. Stock removal averages 1/4″ and may run up to 3/8″. Using a plunge cut, customer obtains 6 completed pieces per hour and from 187 to 220 pieces per grind of the cutters. B-C Cutters have proved, time and again, that they can overcome difficulties on troublesome jobs — which makes them all the more reliable for the ordinary run of work. *For durability and dependable performance, use Barber-Colman Milling Cutters.*

Buy War Bonds

BARBER B-C COLMAN PRODUCTS
HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

Barber-Colman Company

GENERAL OFFICES AND PLANT • 111 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.



The finest ball bearings human skill can devise

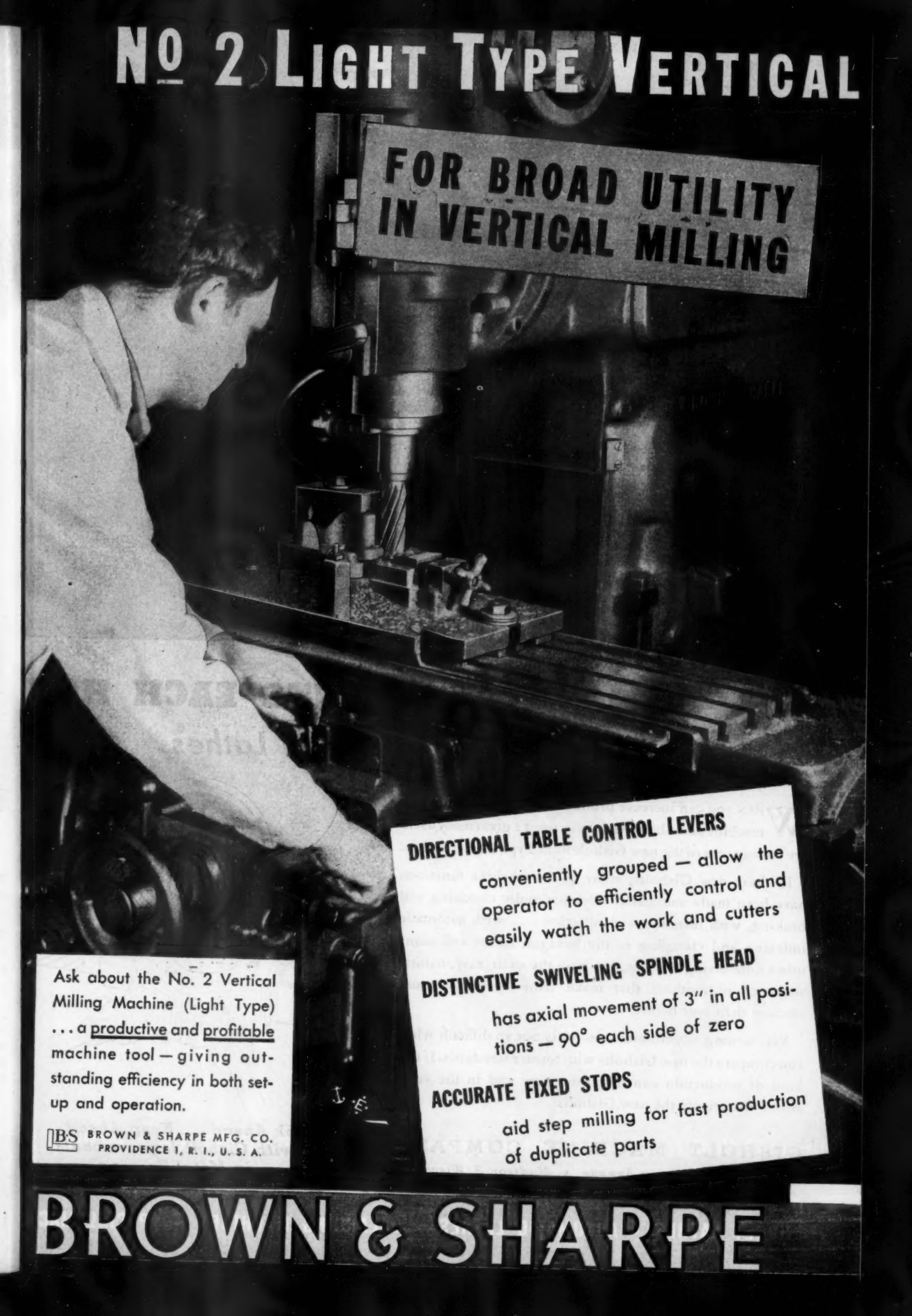
Schatz

PRECISION BALL BEARINGS

THE SCHATZ MANUFACTURING CO.
POUGHKEEPSIE, N. Y.

REPRESENTATIVES LOCATED AT
Detroit: 2640 Book Tower—26 • Cleveland: 402 Swetland Building—15
Chicago: 902 S. Wabash Ave.—5 • Los Angeles: 5410 Wilshire Blvd.—36

No 2 Light Type Vertical



FOR BROAD UTILITY IN VERTICAL MILLING

DIRECTIONAL TABLE CONTROL LEVERS

conveniently grouped — allow the operator to efficiently control and easily watch the work and cutters

DISTINCTIVE SWIVELING SPINDLE HEAD

has axial movement of 3" in all positions — 90° each side of zero

ACCURATE FIXED STOPS

aid step milling for fast production of duplicate parts

Ask about the No. 2 Vertical Milling Machine (Light Type) . . . a productive and profitable machine tool — giving outstanding efficiency in both set-up and operation.

B·S BROWN & SHARPE MFG. CO.
PROVIDENCE 1, R. I., U. S. A.

BROWN & SHARPE

WE PUT 90 MINUTES INTO EACH HOU

with these new Turret Lathes

WHEN you can increase production by 50%, you have a machine and a half! And that's what a great many users are finding true of the new Gisholt Ram Type Turret Lathes.

In these new Gisholts, many of the machine functions have been made automatic. With hydraulic clutching and braking, with instant speed selection . . . with automatic indexing and clamping of the hexagon turret and many other time-saving features, you have the swift, easy, natural sequence of motions that make lathe operation more efficient than ever before.

Yes, turning 60 minutes into 90 is not so difficult when you compare the new Gisholts with former standards. If this kind of production can help you, now and in the years ahead, investigate the new Gisholts.

GISHOLT MACHINE COMPANY

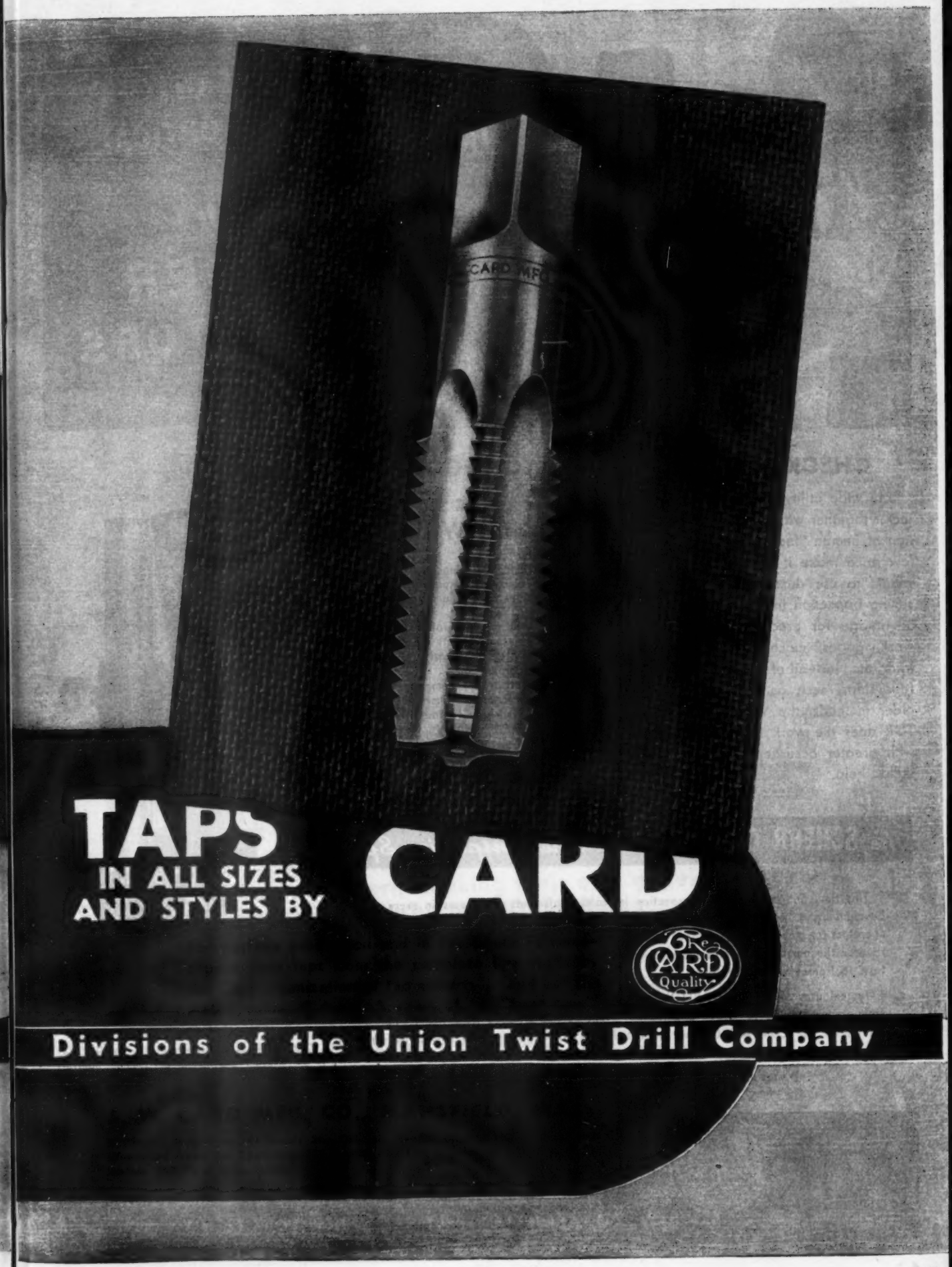
1201 East Washington Avenue • Madison 3, Wisconsin

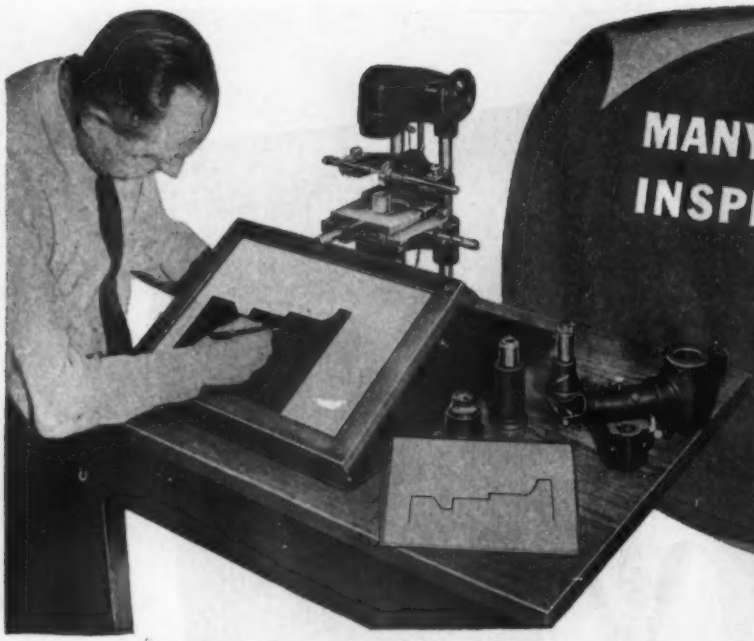
Look Ahead . . . Keep Ahead . . .
with Gisholt Improvements
in Metal Turning

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHI

"Union Quality"
END MILLS
Union Twist Drill Co., Athol, Mass.
UNION ★ BUTTERFIELD ★ CARD Divisions of the Union Twist Drill Company

Butterfield
THRED-RITE
DIES AND HOLDERS
Available in a wide range of sizes!
BUTTERFIELD
DIVISION
Derby Line, Vt.
Rock Island, Que.
UNION ★ BUTTERFIELD ★ CARD


TAPS
IN ALL SIZES
AND STYLES BY
CARD
CARD
Quality
Divisions of the Union Twist Drill Company



EVERY PLANT HAS MANY USES FOR OPTICAL INSPECTION . . . with WILDER PROJECTORS

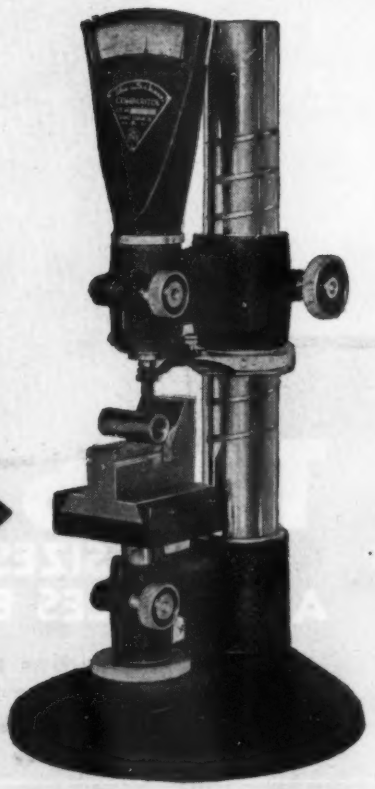
CHECKING TIME REDUCED TO SECONDS

The wide utility of the Wilder Projector together with its speed, elimination of human "feel", and reasonably low price make it possible for many plants to use dozens of these time-saving inspection instruments to great advantage for precision checking of work, gages, machine settings, tool wear, etc. Instead of requiring three or four steps, such as are involved in older methods, the WILDER PROJECTOR does the work in *one step* and with greater accuracy even with unskilled help.

A few users having 10 or more "WILDERS"

General Electric Company
Western Electric Company
Sylvania Electric Products, Inc.
Ford Motor Co.
Bendix Aviation Corporation
Picatinny Arsenal
General Motors Corporation
Ex-Cello Corporation
The Geometric Tool Company
Springfield Ordnance District
Henry L. Crowley Company

Write for Bulletin giving complete details on the "WILDER" and its outstanding advantages in fast, wide-range optical inspection.



The SCHERR COMPARITOL *another Inspection Speeder*

This time and money saving inspection instrument also has many uses in every plant. By eliminating the human element of "feel" it has reduced the need for highly skilled operators for making close tolerance inspections. Furthermore, the SCHERR COMPARITOL reduces the number of operations involved in inspecting parts in quantity to one simple, fast, fool-proof visual operation.

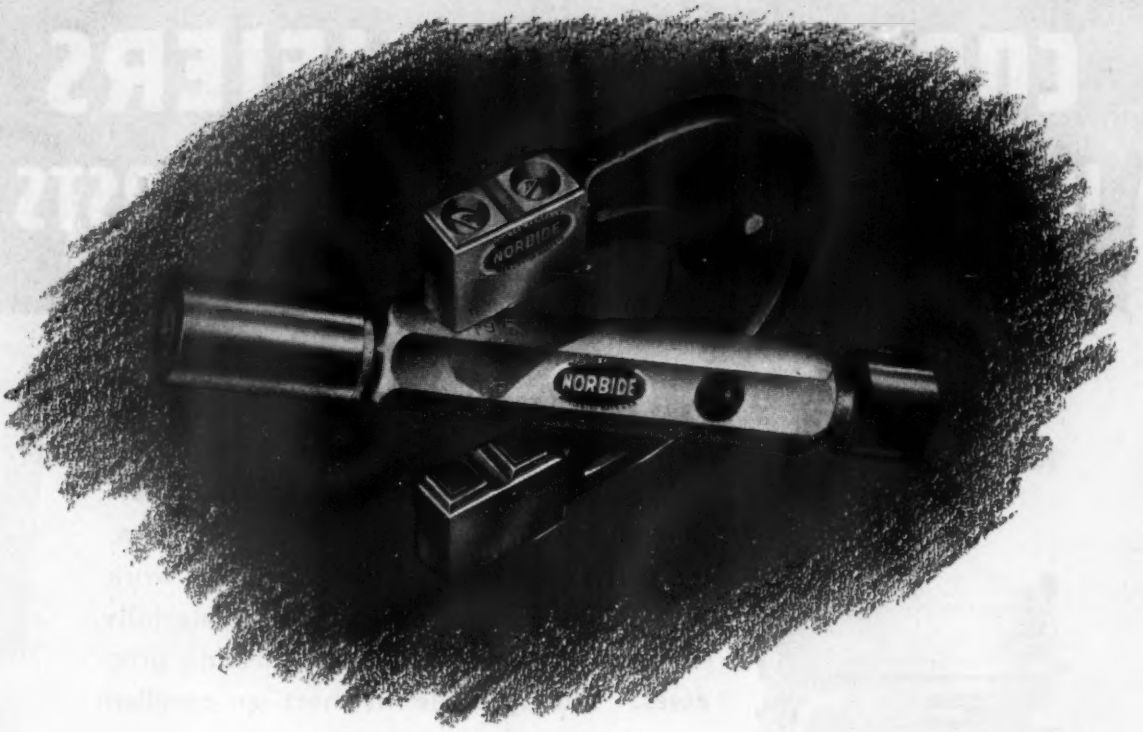
Typical uses of the COMPARITOL include checking ground work, plug gages, pivots, pins, precision parts to .0001" and .00005" right in the grinding department. For special needs, the COMPARITOL may be fitted with attachments which extend its utility.

Write at once for Bulletin giving detailed specifications.

"PRECISE. PRODUCTION"—a SCHERR publication distributed at regular intervals FREE to anyone interested in modern inspection methods—will be sent on request.

GEORGE SCHERR CO.
INCORPORATED
200 LAFAYETTE STREET, NEW YORK 12, N. Y.

NORBIDE* Gages Last Longer



NORBIDE Gages last longer—100 times and more—than conventional types of measuring devices. For NORBIDE (Norton Boron Carbide) is the hardest material made by man and, therefore, it possesses great resistance to wear. Furthermore, NORBIDE gage members will not pick up lint nor become charged with particles of metal.

Norton Company supplies NORBIDE gage blanks to gage manufacturers and to concerns making their own gages. Ask your regular gage manufacturer for NORBIDE gages and prove to yourself how the hardest material made by man increases gage life 100 times and more.

Or if you wish additional information write to Norton Company and for interesting information on NORBIDE gages request booklet No. 1100.

NORTON COMPANY **Worcester 6, Mass.**

Hardest Material Made by Man

DE LAVAL
COOLANT CLARIFIERS
HELP LOWER PRODUCTION COSTS

DE LAVAL Coolant Clarifying Systems keep grinding coolants free from harmful abrasive and metallic sediment. They make it possible to grind to closer limits, lessen the likelihood of distorting the work or starting fatigue cracks, and materially reduce the time required for finishing processes. They provide, in short, an excellent means of cutting production costs.

Another saving results from the fact that grinding wheel life is prolonged when coolant is continuously clarified with a De Laval centrifugal machine. Moreover, softer wheels can be used, and both oil and aqueous coolants last longer.

Investigate without obligation how the De Laval Coolant Clarifier can help you obtain both greater production and improved quality.

☆ ☆ ☆

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 19
THE DE LAVAL COMPANY, Limited
MONTREAL PETERBOROUGH WINNIPEG VANCOUVER

DE LAVAL
"Hermetic"
COOLANT CLARIFIER

Read how Industrial Users* Have Profitably Applied Deepfreeze

Sub-Zero Chilling Machines

...in applications like these

Tool Hardening

...When machining 4820 steel forging, form tool became dull after running 150 pieces...tool was subjected to Deepfreeze process and then cut 510 pieces...foreman said: "You sure have run into something. Why don't you treat all our tools in a Deepfreeze?"

...Corrugating tools for cutting grooves in chilled rolls were increased from 63-64 to 68-69 Rockwell C hardness by treatment in a Deepfreeze...this is "tops" for that job.

Metal Stabilizing

...In all cases we have found that by using the proper heat treatment and Deepfreeze process...in stabilizing our gauge blocks and large lapping flats...we have been able to promote all of the growth and thereby prevent any further distortion.

Shrink-fit Assembly

...Our Deepfreeze machine is saving us between $3,000 and $4,000 per month over the cost of liquid air for chilling a bushing assembled in a Diesel engine piston...another type of chilling unit did not provide sufficient shrink for proper assembly.

Low-Temperature Testing

...Deepfreeze machine used for testing aircraft components, both production items and experimental models ...much time and expense saved in eliminating difficulties which otherwise would not show up until the item had been in use on the airplane at high altitude.

Other Applications

...Improving magnetic properties of steel magnets, storage of aluminum rivets and parts...repair of broken milling cutters ..freezing of rubber and rubber-like plastics for machining...salvaging of worn gauges by promoting growth...and many others.

The process of sub-zero cooling in a Deepfreeze Cascade −120° F. Chilling Machine is being profitably used in diversified industrial applications to obtain new high standards not possible under previous methods.

No more convincing proof can be offered than the results obtained in actual, practical applications. A few typical statements contained in letters from industrial users are reproduced at the left . . . many more reporting equal success have been received from manufacturers, jobbing shops, heat treating plants and other business firms.

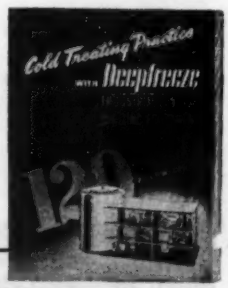
Deepfreeze Industrial Chilling Machines are used most widely in the fields of tool hardening, metal stabilizing, shrink-fit assembly and low-temperature testing. They are also employed for storage of aluminum rivets and parts, freezing rubber for machining, removing pitch from optical lenses, salvaging worn gauges, and many other applications where the ability to attain sub-zero temperatures quickly can be used to advantage.

Removes 1000 B.T.U.'s per hour at —120° F.

The Deepfreeze Cascade −120° F. Industrial Chilling Machine has the capacity for *high production* metal chilling. This unit will remove 1000 B.T.U.'s per hour at −120° F. when work is immersed in convection fluid. Primary freezing surfaces of over 31 sq. ft. are provided. A full 4" of Santocel insulation and the efficiency of the "Cascade" system of heat removal result in minimum operating costs.

Investigate Cold Treating

Learn how you can profitably apply Deepfreeze sub-zero temperatures in your own plant—easily, economically, and with uniform success. Get performance data on many actual applications. Write for *"Cold Treating Practice"*—a FREE 40-page illustrated booklet that gives recommended procedures and all of the latest authentic information. Ask for Bulletin No. 1-4.



Deepfreeze Used by Topflight Manufacturers

Deepfreeze sub-zero chilling machines are being used profitably every day in the nation's leading industrial plants, large and small. Partial list of users in this booklet (see page 38).

*NAMES FURNISHED ON REQUEST

Only Motor Products can make a "DEEPFREEZE"

Deepfreeze

TRADE MARK DEEPFREEZE REGISTERED UNITED STATES PATENT OFFICE

Industrial Chilling Equipment for Shrinking, Testing, Hardening and Stabilizing Metals

2327 DAVIS STREET
NORTH CHICAGO, ILLINOIS

Division of Motor Products Corporation, Detroit, Michigan

EXERT A SHORT BUT EXTREMELY POWERFUL SQUEEZE ON THE METAL

Cleveland Knuckle Joint Presses are adapted for a great variety of operations in the field of embossing, coining, sizing, heavy stamping, extruding and heading. They are ruggedly and accurately constructed throughout and embody all of the latest and best features which our wide experience has shown to be essential to economical production and low upkeep.

Two of the outstanding features of Cleveland design are, the long bearing surfaces for the slide and the massing of material at points of greatest stress. These two features contribute greatly to the accuracy with which the parts are produced by insuring ample bearing surface even when the slide is at the extreme end of its stroke and by reducing the spring or deflection on the frame when the Press is taking its maximum load.

This type of Press exerts a short but extremely powerful squeeze on the metal through massive and carefully fitted knuckles.

On the larger sizes, the load is carried directly on four massive tie rods and this construction relieves the tension load on the side members, consequently the dies are guided with greater accuracy.

The smaller sizes have one piece frames of ample proportions and are capable of taking their maximum load easily as they are designed with a good margin of safety.

Adjustment to the slide is accomplished by means of a taper wedge which runs from right to left giving maximum support to the entire knuckle. On the smaller sizes of Presses, a hand wheel is provided for making this adjustment while on the larger Presses a ratchet lever, conveniently located at the side of the Press, is employed.

Cleveland Knuckle Joint Presses can be furnished in a wide range of standard sizes as shown in the following table:

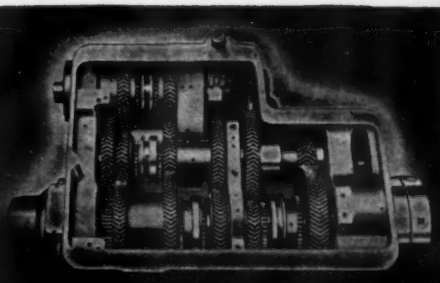
Size of Press	½ K	¾ K	1 K	1½ K	2½ K	4 K
Capacity in Tons	50	75	100	150	250	400
Size of Press	6 K	8 K	10 K	12 K	15 K	20 K
Capacity in Tons	600	800	1000	1200	1500	2000

THE CLEVELAND PUNCH & SHEAR WK'S CO. U.S.A.

THE CLEVELAND PUNCH & SHEAR WORKS CO

CLEVELAND • OHIO

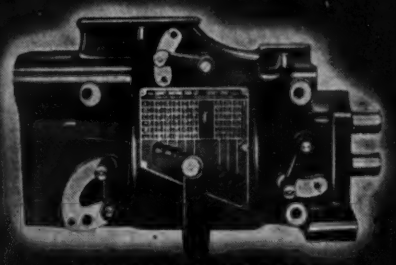
RIGID BED CONSTRUCTION



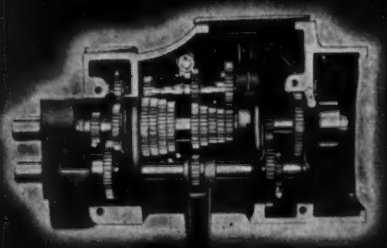
CONTINUOUS TOOTH 30° HELIX HERRINGBONE GEARED HEAD

Sidney

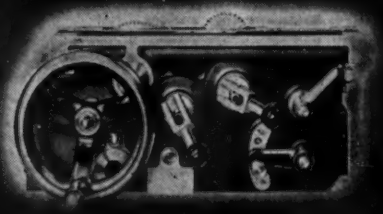
40TH ANNIVERSARY



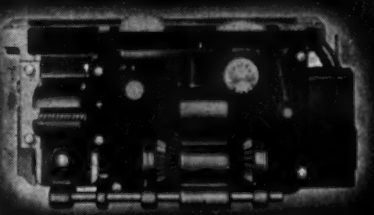
FRONT VIEW OF GEAR BOX



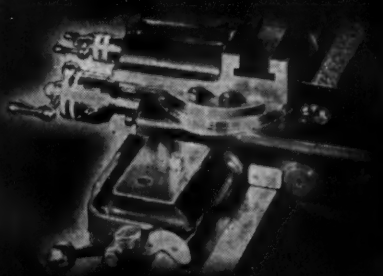
REAR VIEW OF GEAR BOX



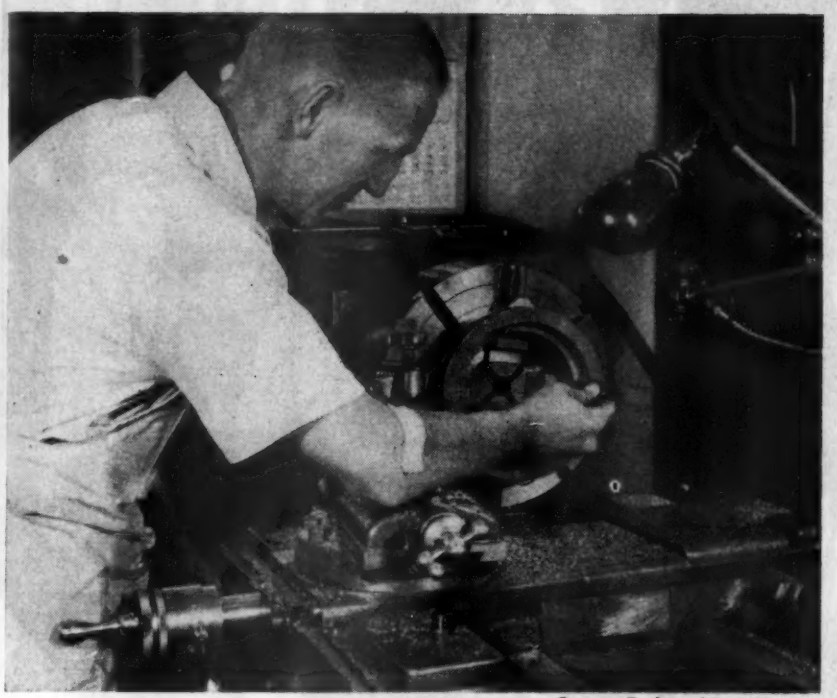
FRONT VIEW OF DOUBLE WALL APRON



REAR VIEW OF DOUBLE WALL APRON



SIDNEY COMPOUND REST



Courtesy Rockwood Sprinkler Co.

For your precision jobs use a SIDNEY LATHE

Turning Die Parts as shown here is only one of a host of precision jobs handled on Sidney Lathes—quickly—easily—accurately.

The continuous tooth Herringbone geared head assures a smooth flow of power to the spindle—greater strength—and freedom from end thrust due to opposed helix angle.

This is only one of many design and construction features of Sidney Lathes that permit high production—precision work—and low cost operation. *Bulletins on all sizes available.*

The SIDNEY MACHINE TOOL Company

Builders of Precision Machinery

SIDNEY ESTABLISHED 1904 OHIO

FOSDICK HIGH SPEED DRILLS•••

do their part in producing a new weapon of war

Photo Courtesy of Fairchild Camera and Instrument Corporation

● The Fairchild camera illustrated is one of several models used to obtain vital information for all branches of our armed forces. The pictures taken supply clear and accurate information for maps, charts, bomb damage, troop and convoy movements.

Fairchild Cameras are precision instruments requiring exceptionally accurate machine work. Fosdick 6- and 4-spindle High Speed Drills are used extensively for drilling—reaming and counterboring various parts for these instruments.

The battery of 4-spindle High Speed Drills shown are drilling shutter housings for large F-56 camera—the main frame of the aerial sextant—and the shutter housing for the gun camera. These are but a few of the jobs handled by Fosdick High Speed Drills in this plant. Cases—cones—lens—shutter housings—film magazine parts—all are handled by these high speed drills for precision holes from 0.16 inch to 1¼ inch.

The tolerances maintained range from .002 inch for drilling—.0005 inch for reaming and .001 inch for counterboring.

This battery is only one of thousands of Fosdick High Speed Drills now operating in hundreds of plants producing precision work vital to our war effort.

For full particulars write for the Fosdick High Speed Drill Bulletin H.S.A.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, ••• OHIO

88,000 pounds per sq. in. tensile strength in extruded shapes, 75,000 pounds in alclad sheet—stronger than any aluminum alloy in use today—nearly two times the yield strength of ordinary structural steel and one and one-third times the tensile strength. That's Alcoa's new high strength alloy, 75S.

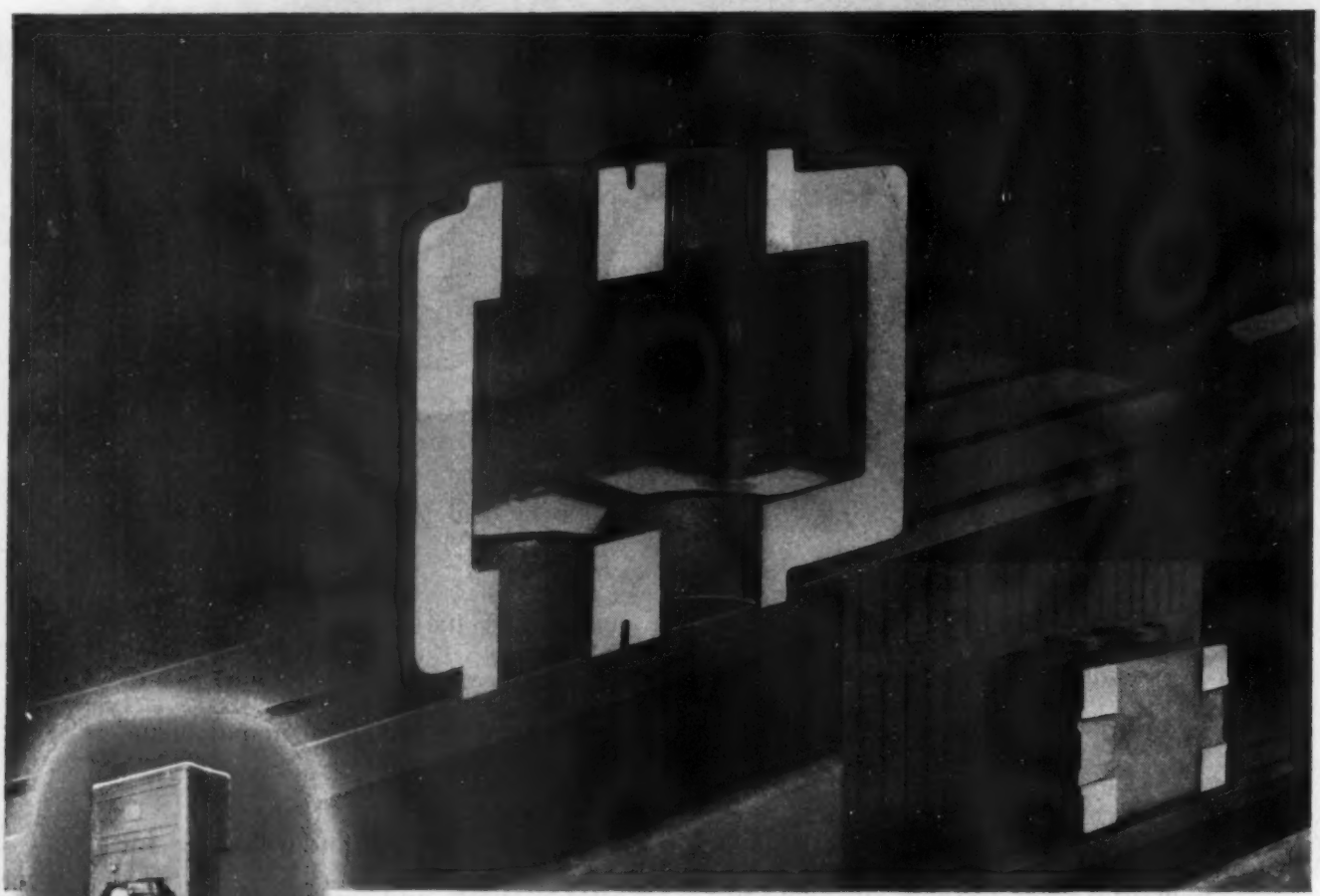
No untried youngster, this alloy. Alcoa's research and development divisions have spent years in testing the performance of experimental quantities. In the fall of 1943, the first commercial run was put through Alcoa mills, and production has continued at an ever-increasing pace. Already, at least eight major aircraft companies are building new experimental planes in which 75S is the principal structural material.

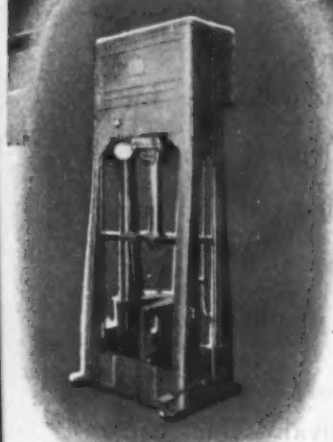
75S is now a standard alloy for alclad sheet and extruded shapes. Plain sheet, plate, rolled rod and bar made from 75S continue on an experimental basis, but may be obtained for certain projects.

With WPB approval, you can employ 75S in your products. Our representatives will gladly help you work it into your designs. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM

HOW LONG WOULD IT TAKE YOU TO MACHINE THIS PIECE FLOOR-TO-FLOOR?





AND LOOK AT THIS PRESS

Does an amazing variety of work—assembling, broaching, straightening, riveting, forcing, pressing, etc. EASY TO OPERATE. Completely equipped ready to operate. Capacity 40 tons. Send coupon below.

Take a good look at this job—a close-grained grey iron gear housing measuring 18¼" x 14". Has to be faced both sides. Parallelism is important. Bearing side has to form an oil seal. How many minutes do you figure it would take you to machine this piece *floor-to-floor*—60?—70?—80? or more? Now, prepare yourself for a surprise!

Facing both sides floor-to-floor with a Diamond Face Grinder requires just *12 minutes,* removing a total of ⅝" stock! Piece is held by a magnetic chuck only, without even a bearing on platen while facing feet! Compare the finish and time with any other method of machining then send coupon for the new folder on Diamond Face Grinders . . . today.

"THE DIAMOND D THAT CUTS YOUR COSTS"

Diamond Machine Company of Philadelphia
2435 Aramingo Avenue, Philadelphia 25, Pa.

Gentlemen: ☐ Send your Bulletin 44-G which shows how to step-up production with the Diamond Face Grinder.
☐ Mail folder describing the Diamond "40" Press.

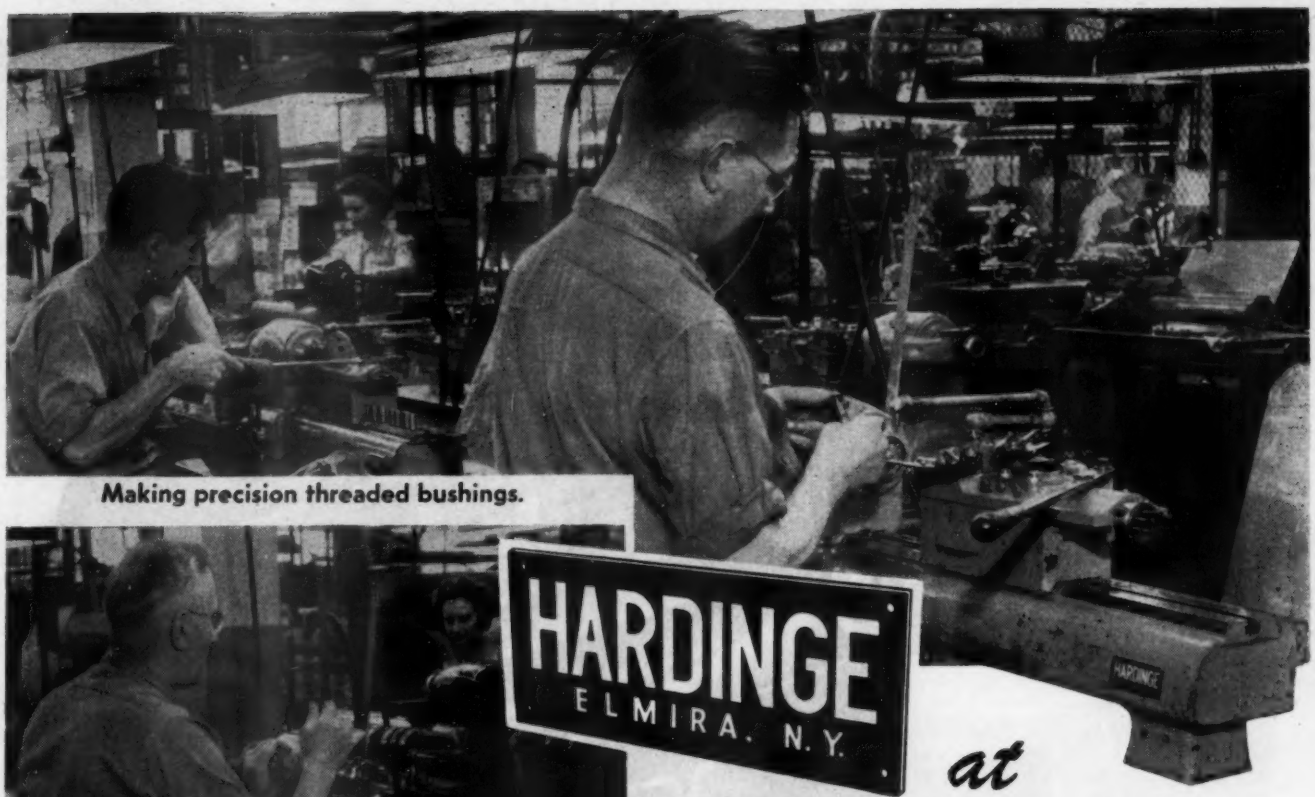
Name_____

Company_____

Address_____ State_____

City_____

DIAMOND
MACHINE COMPANY
OF PHILADELPHIA



Making precision threaded bushings.

Turning angle face of generator rings to length.

Facing retaining rings.

HARDINGE
ELMIRA, N.Y.

at

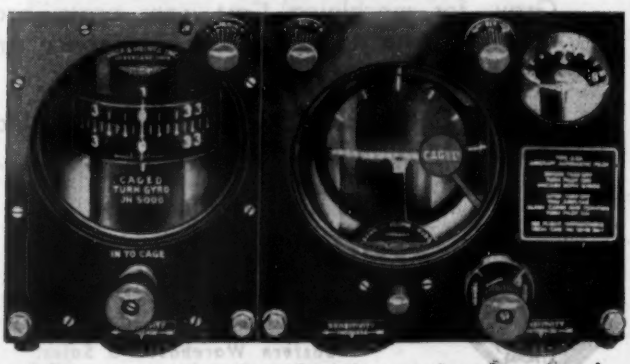
JACK & HEINTZ, Inc.

Since 1917 Bill Jack has been heading companies which manufactured precision parts, so it was only natural that Hardinge lathes were selected for precision operation at Jack & Heintz, Inc. of Cleveland.

Jahco now manufactures automatic pilots, flight instruments, engine starters, generators and other aircraft units requiring high precision tolerances customarily being inspected to a few ten-thousandths. Some parts of these instruments are more delicate than a watch yet Jahco makes them on a volume production basis.

Hardinge precision lathes have played their part in permitting such accuracy with the necessary speed to meet high production schedules. No plane has ever been held on the ground for lack of a promised Jahco unit. No less than twenty Jahco units are made for the new Boeing B-29 Superfortresses.

HARDINGE BROTHERS, INC.
ELMIRA, N. Y.



Jahco automatic pilot which keeps the plane level and on the course set.

ARMSTRONG ARMIDE *Carbide* TOOL SETS

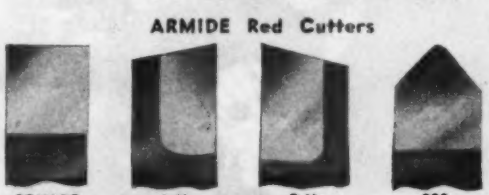
CARBIDE-TIPPED TOOLS FOR EVERY-DAY OPERATIONS

ARMIDE TOOL SETS simplify many everyday jobs in tool rooms, shops and maintenance departments. They are standard, multi-purpose tools which offer special advantages on machining operations involving: (1) Long runs, (2) High speed operation, (3) Cast iron, (4) Tough alloy steels, (5) Non-metallics, (6) Hardened parts (obviate need for annealing and re-hardening).

Each set comprises: 3 ARMSTRONG *Carbide* TOOL HOLDERS, 8 ARMIDE Carbide-Tipped Cutters—4 ARMIDE Red, for machining steel and 4 ARMIDE Gray, for machining Cast iron, brass, bronze, aluminum and non-metallics; with service wrench in a filled steel case. (as illustrated)

ARMSTRONG-ARMIDE Sets are stocked by leading Industrial Distributors in 4 sizes.

Write for Bulletin-C844.



ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

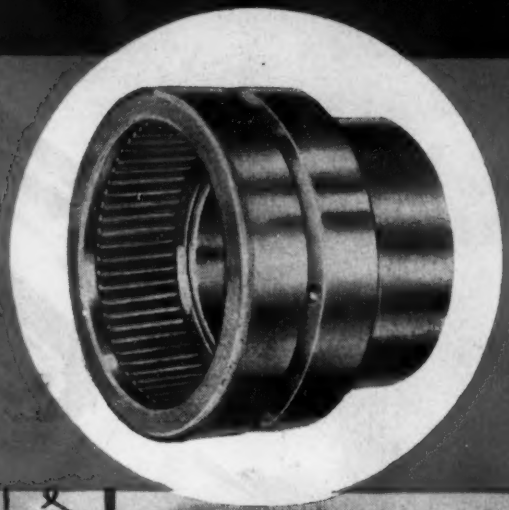
315 N. Francisco Ave., CHICAGO 12, U.S.A.

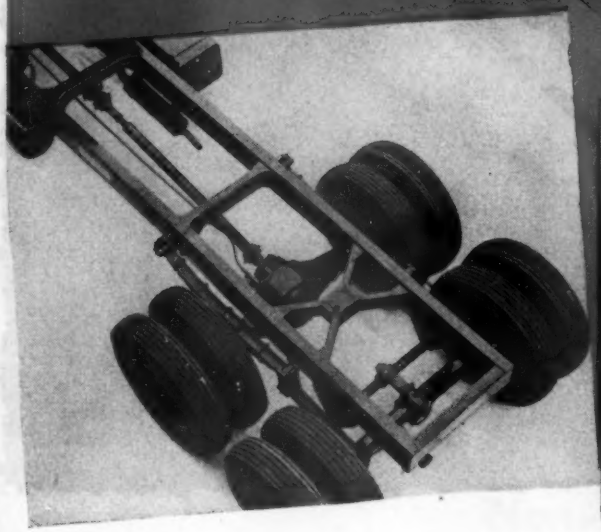
Eastern Warehouse & Sales:

199 Lafayette St., New York

ORANGE ROLLER BUSHINGS

STAND UP UNDER SEVERE SERVICE IN Cook Bros. Truck Attachments





The 3rd axle and center chain drive attachments made by Cook Bros. of Los Angeles, are used in heavy logging, dump truck operations, freight hauling, etc. That takes ruggedness—both in the equipment and the parts going into it.

The 3rd axle attachment (upper left) uses Orange Roller Bushings in the forward rocker arm pivot end holding the lower spring shackle; also in the center pivot point of the main rocker arm, holding the trunnion shaft. The center chain drive attachment (lower right) uses four Orange Roller Bushings in the spring saddles for the jackshaft spindles. All tough service spots—and all operating smoothly, faultlessly.

Where loads are high, space limited, operating conditions severe—install Orange Roller Bushings. Full range of types and sizes. Send coupon for Engineering Data Book showing sizes, capacities, installation data, etc.

ORANGE ROLLER BEARING CO., INC.
554 Main Street, Orange, N. J.

Mail Coupon for Engineering Data

Orange Roller Bearing Co., Inc., A.M.
Orange, N. J.

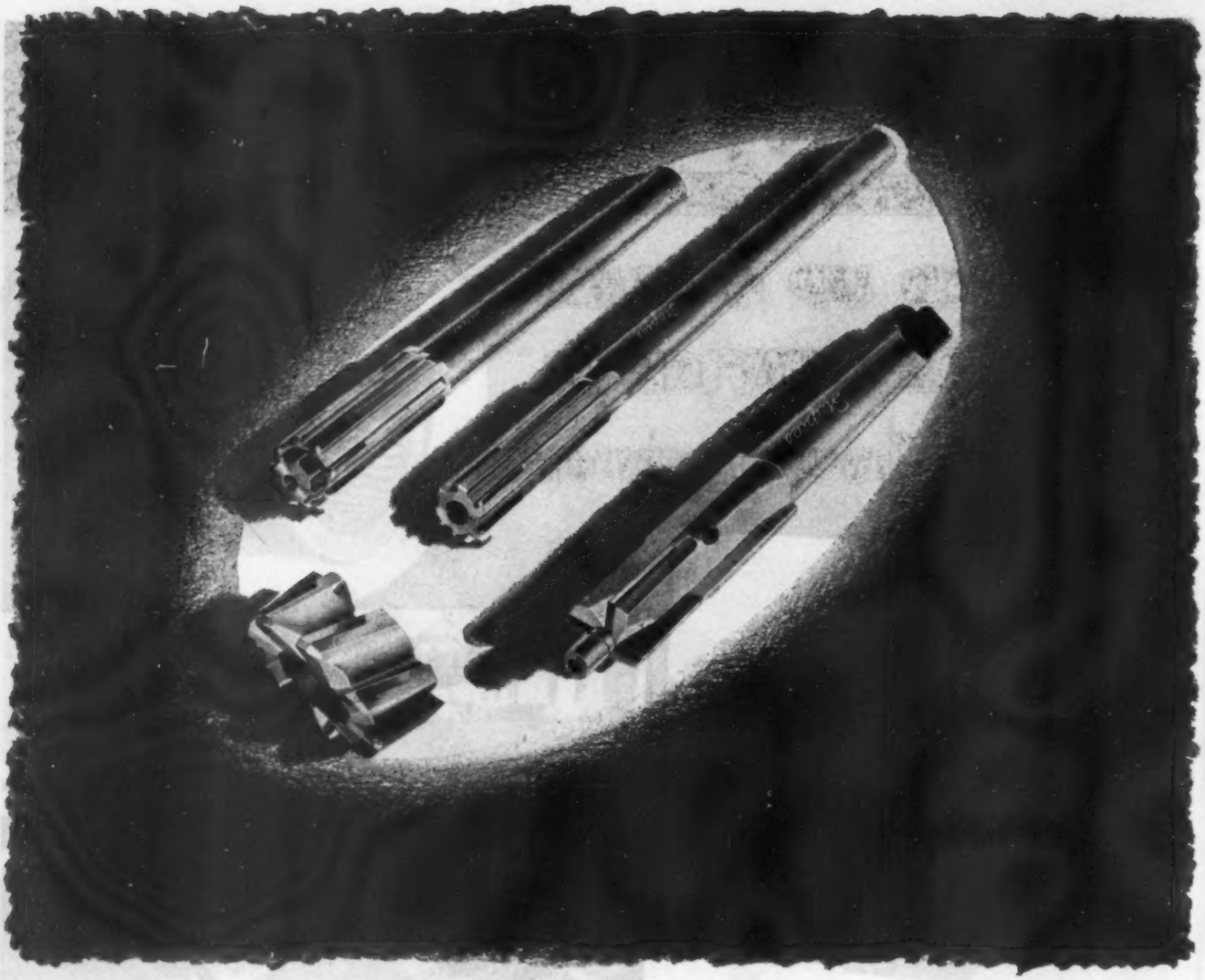
Please send me your Roller Bushing Data Book

Name..... Title.....

Company.....

Address.....

City..... State.....



NOW... *AIRCRAFT ACCURACY*

IN CUTTING TOOLS... FOR ALL

Since Staples was founded most of its output of Carboloy-Tipped Circular Cutting Tools has gone into the building of aircraft engines. In fact, more Staples Carboloy-Tipped Reamers than all other makes combined are used by aircraft engine manufacturers.

Now, greatly increased production facilities make it possible for you to enjoy the benefits of these tools, made to meet the needs of aircraft accuracy. No matter what industries your products serve, you can make use of today's highest quality cutting tools.

Our line of standard design tools is complete, but we will also make special design tools to your specifications.

Send for the most comprehensive information published on reamer usage and design, contained in our Catalog No. 44.

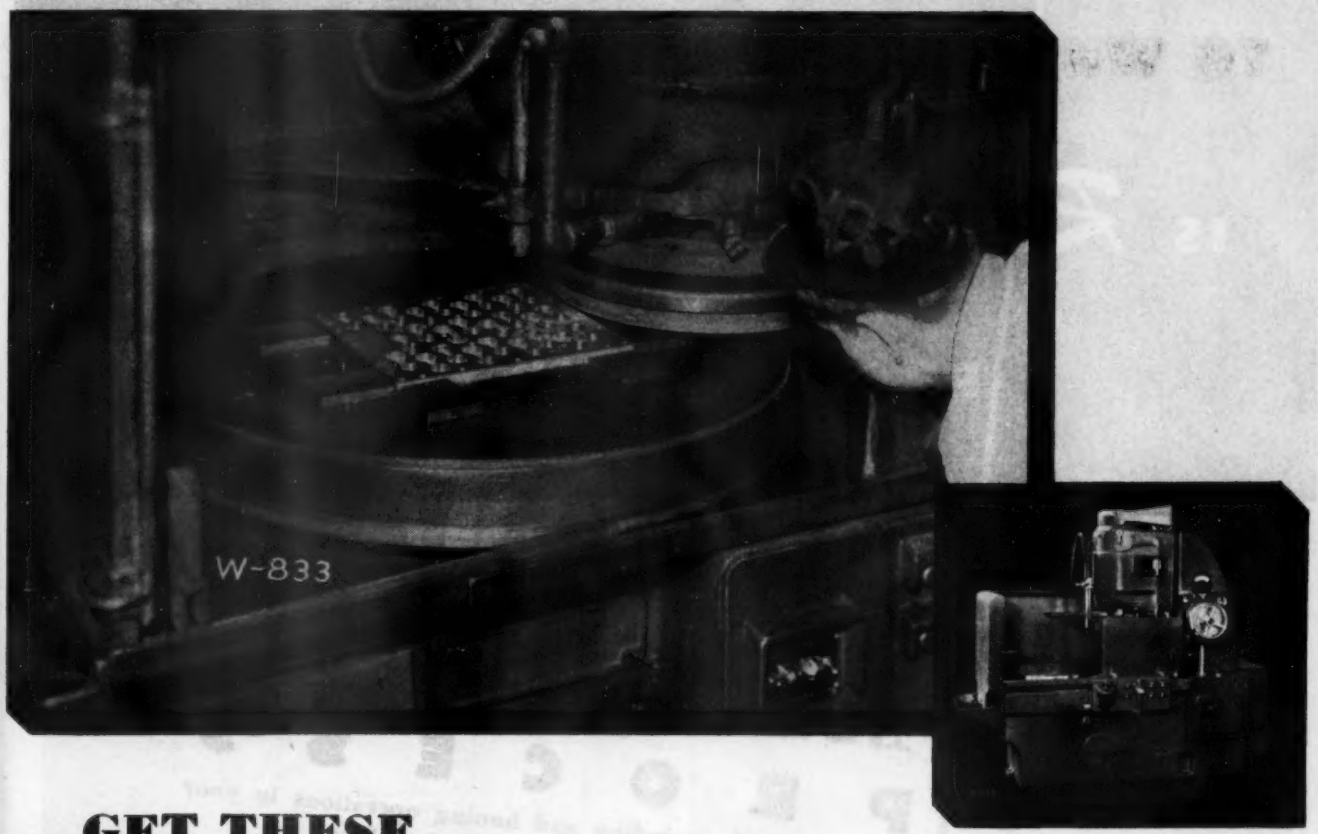
STAPLES TOOL & ENGINEERING COMPANY
CINCINNATI 25, ... OHIO

Staples CARBOLOY-TIPPED CIRCULAR CUTTING TOOLS

REAMERS • CORE DRILLS • SPOT FACERS • COUNTERBORES • END MILLS • SHELL END MILLS • ALSO A COMPLETE LINE OF CIRCULAR SPECIAL TOOLS

DISTRIBUTORS: The Cameron & Barkley Co., Charleston, S. C., Jacksonville, Fla., Tampa, Fla., Miami, Fla.; G. F. Cotter Supply Co., Houston, Texas; J. E. Dilworth Co., Memphis, Tenn.; The John C. Eide Co., Minneapolis, Minn.; Empire Machinery & Supply Corp., Norfolk, Va.; Fuchs Machinery & Supply Co., Omaha, Neb.; General Carbides Company, Newark, N. J.; Machinery Sales & Supply Co., Dallas, Texas; Marshall Supply & Equipment Co., Tulsa, Okla.; The Mine and Smelter Supply Co., Denver, Colo.; Murray-Baker-Frederic, Inc., New Orleans, La.; A. N. Nelson, Inc., Brooklyn, N. Y.; Sager-Spuck Supply Co., Inc., Albany, N. Y.; Screw Machine Supply Co., Chicago, Ill.; Strong, Carlisle & Hammond Co., Cleveland, Ohio; Syracuse Supply Co., Syracuse, N. Y.; Sterling Supply Co., Detroit, Mich.; Muskegon Hdwe. & Supply Co., Muskegon, Mich.; Harold W. Kimball Co., Waterville, Me.; White Supply Co., Waterbury, Conn.; J. E. Hazeltine & Co., Portland Ore., The L. A. Benson Co., Inc., Baltimore, Md.; El Paso Saw & Belting Co., El Paso, Texas.; Quinn & Quinn, Birmingham, Ala.

"Put it on the Blanchard"



No. 18 BLANCHARD SURFACE GRINDER

...GET THESE ADVANTAGES

Production ✓
Adaptability ✓
Fixture Saving ✓
Operation Saving
Material Saving
Fine Finish
Flatness ✓
Close Limits

Non-Magnetic Work is Easily Ground

These brass plates 14½" x 12⅝" x ¾" are ground on both sides to almost clean the surfaces before holes are drilled. After drilling, one side is ground flat within .003" removing .005" to .006" of stock. Production is 15 plates per hour.

The brass plate is laid on the magnetic chuck and blocked on all sides by steel pieces held magnetically. The picture shows the plate as chucked for finish grinding. In rough grinding the same setup is used with shims under the work, if needed, to prevent rocking.

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

The BLANCHARD MACHINE COMPANY
64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

THIS *New Approach*

TO WHEEL AND COOLANT ENGINEERING

IS *Revolutionizing* GRINDING

PRACTICE AND RESULTS

QUAKER

MICROGRIND

PROCESS

applied to the grinding and honing operations in your plant, makes possible these specific benefits:

- **Elimination of cracks on ground surfaces.**
- **Elimination of burns and distortion due to grinding.**
- **Much finer truly ground finishes.**
- **Greatly increased number of pieces obtained for each wheel dressing. (usually tripled)**
- **Immediate wheel life increase. (often 200% or 300%)**
- **Power consumption cut approximately 50%.**
- **Great increase in grinding production and virtual elimination of rejects.**

A Quaker Process Engineer will welcome the opportunity to provide details and prove all the above claims *at our expense!*

QUAKER CHEMICAL PRODUCTS CORP.

CONSHOHOCKEN, PA.

Other Plants in CHICAGO and DETROIT · Warehouse Stocks in Principal Industrial Centers

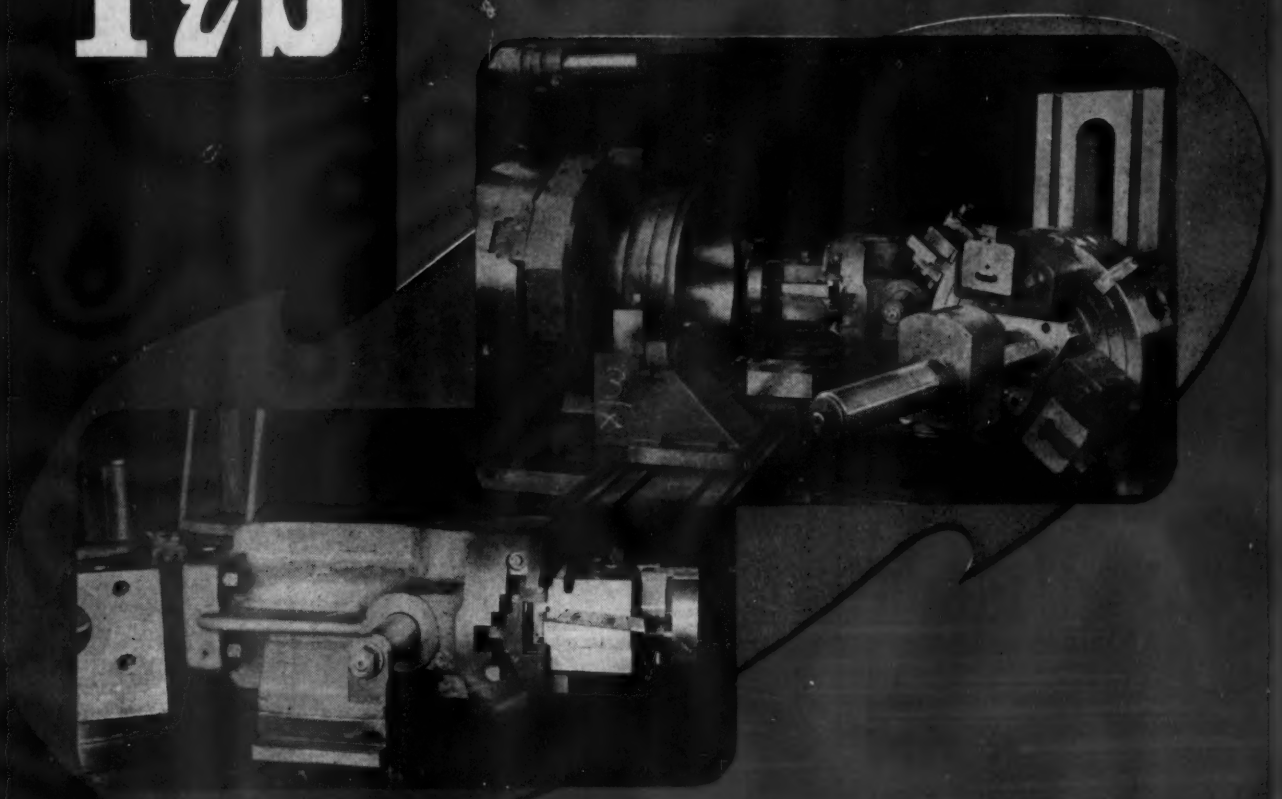
A Progressive Organization of Research and Process Engineers and Manufacturing Chemists

Name ..... Position .....

. . . PLEASE PRINT COMPANY NAME AND ADDRESS IN MARGIN BELOW . . .

P & J ··· RE-TOOLING

provides an economical way to cut tomorrow's production costs



Time and again P & J engineers have helped speed jobs and reduce production costs. The set-up shown here for machining brake drums on a P & J 6DRELX Automatic is but one of many where tooling experience combined with the tooling possibilities of P & J Automatic Chucking and Turning Machines have been instrumental in achieving high production at low piece cost. This same combination offers the means of making production savings on new work because it makes re-tooling both possible and practical.

Users of P & J machines are invited to investigate P & J Re-tooling to meet the requirements of the jobs they will be called upon to handle in the future. Our engineers are at your command to discuss this subject with you and show you how, through P & J RE-TOOLING, you can meet or better those competitive production costs which are certain to be your problem in the very near future.

THE POTTER & JOHNSTON MACHINE CO.

Pawtucket, R. I.

P & J REBUILDING SERVICE

P & J is prepared and fully equipped to rebuild your present P & J Automatics and restore them to original productivity and accuracy. Re-tooling can also be handled advantageously at the time machines are in our shop for rebuilding.

Every Bond You Buy BRINGS V-DAY CLOSER

"O.K.–Nope–O.K.–O.K.–"

TO WATCH HIM operate, you'd think Walter Conner of Allis-Chalmers Norwood Works was conducting a one-man scrap drive.

Not that he finds many defective motor shafts in the course of a day's inspection — but he sure *looks* for them. And when he finds one — bang — it lands on a scrap pile.

In a way, it's the group of motors we *didn't* build that's behind the reputation: "You can depend on Allis-Chalmers Motors!"

But actually, building consistently great motors requires far more than rejecting parts and assemblies that don't come up to Allis-Chalmers standards . . . because there are dozens of points in every motor that *can't be tested* by known methods or instruments.

How can you test the honesty and skill with which a rotor end connection was silver-brazed in depth . . . a hidden coil assembled?

You *can't.*

That's why we're glad Allis-Chalmers craftsmen know today — as they've known for years—that they have a big personal stake in every motor they build for you.

They know that when they build great motors they're making *friends* . . . and that no company and its workers can have too many of them.

Next time you need the kind of extra-quality (but not extra-price) motors Allis-Chalmers builds, check with our nearby district office. Or write direct to ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

• • •

A-C VICTORY PEACE

A 1727

YOU CAN DEPEND ON ALLIS-CHALMERS MOTORS

After the Ticker Tape . . . what?

The whistles will blow, the bells will toll—we'll shower them with ticker tape and tears of joy—then what?

Then the victory they've won and all the things they've fought for will be in *our* hands to hold . . . We have all the weapons we could want: Productive capacity, technical skills, buying power, and need. How, then, could we possibly fail?

Only by lack of planning now for total peace.

And in this critical hour of preparedness for peace, the engineers of the basic machine tool producers again have a strategic part to play.

They helped the men of government and of industry to plan the most desperate and gigantic production program of all time . . . and they can help those same men now to solve our post-war problems of reconversion.

One of these is a Bryant man. We offer his services to you.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.

Indispensable!

1 THE "EYES" OF THE AIR—furnishing 90% of all military intelligence and reconnaissance data.

Not one square foot of strategic enemy territory escapes the aerial camera's searching, all-seeing eye. Fairchild Camera & Instrument Corporation manufactures the bulk of these vital cameras which must be ruggedly built to withstand all kinds of operating conditions such as extremes of temperature and humidity. Above all, they must be compact and *precision-made* to guarantee swift, clear, and utterly dependable results.

2 THE MACHINES THAT MAKE THESE "EYES"—precision machines like the P&W VERTICAL MILLER and PROFILER which shapes vital parts to critical tolerances.

Seating surfaces on film magazine base plates, camera bodies, and lens cones — which must be held to tolerances as close as ±.0003″ — are machined on the Pratt & Whitney Vertical Miller & Profiler (Fairchild has 10 of these in constant operation). If specified tolerances are not held here, the focus of the camera lens would be affected. On precision machining of the many irregular castings, Fairchild uses a double-spindle set-up on this machine.

In vitally important work like this where accuracy and dependability coupled with swift production and low cost are prime requisites, the P&W Vertical Miller & Profiler is proving itself "best for the job" 365 days a year. For full details, write Pratt & Whitney, *Division* Niles-Bement-Pond Company, West Hartford 1, Connecticut.

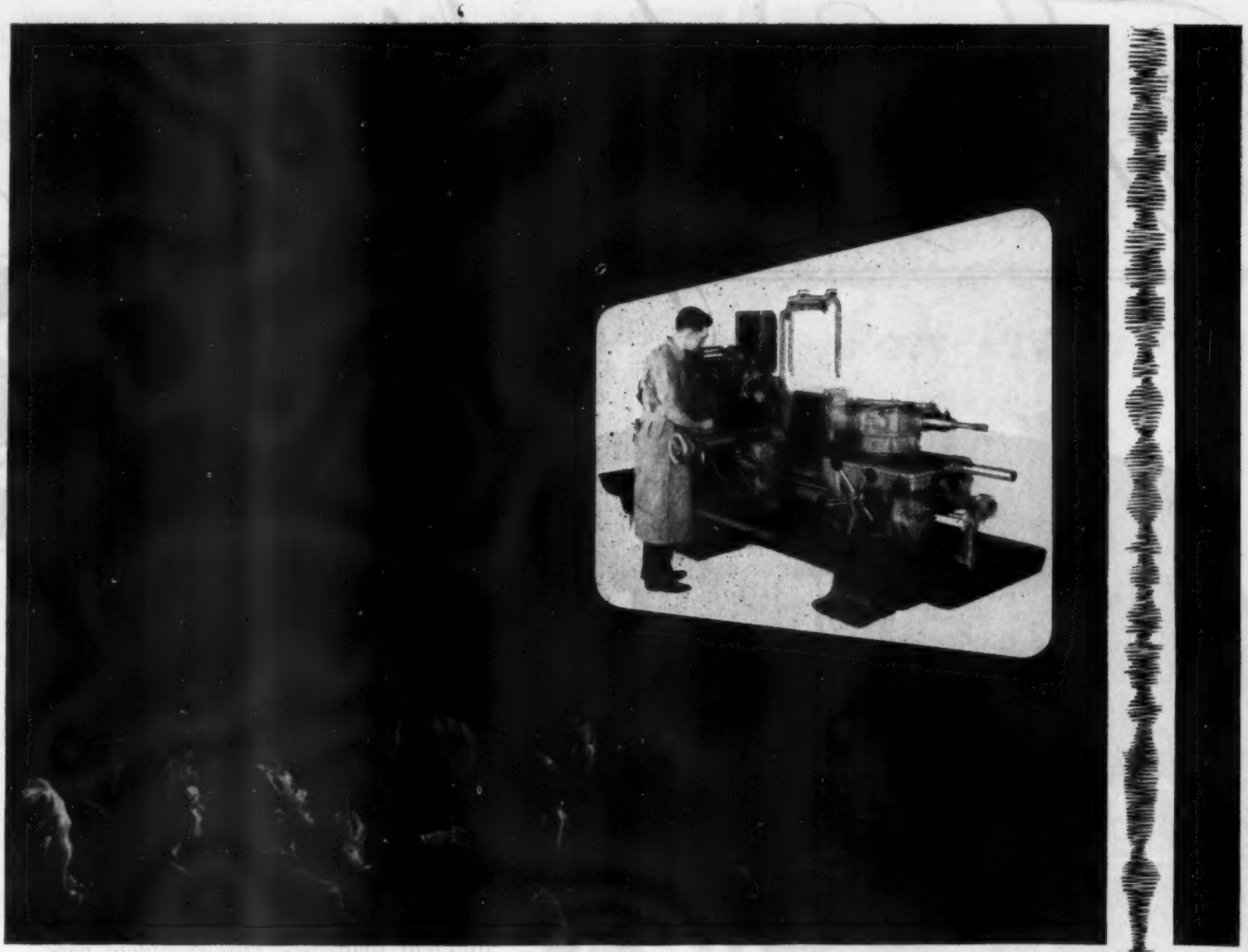
Putting the "Eye" on the enemy. Army photographer using the Fairchild K17 camera for oblique photography. This same unit is also used for mapping and reconnaissance photography. *U. S. Army Air Force Photo*

Accuracy in Action. For machining the body casting of a K18 camera, Fairchild uses a fly cutter operation on a P&W Vertical Miller and Profiler. This is the critical surface upon which the lens cone is attached and must be accurate.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT



"TURRET LATHES . . . Their Operation and Use"

A 45-minute sound and color motion picture

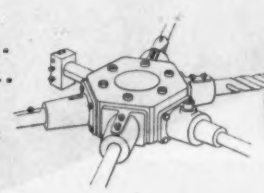
TO HELP train operators more quickly—to give experienced machinists a fresh viewpoint—to assist you in getting more out of your turret lathe department, arrange now to show this highly accredited film in your own plant.

"TURRET LATHES—Their Operation and Use" is produced in full color and sound. It explains the basic design of various types of lathes, covers the field of turret lathe applications, shows methods of setting up machines for various types of work, familiarizes beginners with the location of controls, feeds and the fundamentals of their use. The turret lathe's versatility on many kinds of production work is vividly portrayed. Clear descriptions, accompanied by excellent photography with many close-ups, make this the most comprehensive and authentic presentation of its kind.

"TURRET LATHES—Their Operation and Use" will be loaned without cost except shipping charges to recognized manufacturers, businesses, trade schools, and like organizations upon request. The film is available in 16-mm. size, with sound track. To arrange bookings, write the Gisholt Machine Company for complete information and order blanks. Take advantage of this audio-visual aid in industrial education.

GISHOLT MACHINE COMPANY
1201 East Washington Avenue, Madison 3, Wis.

Look Ahead...
Keep Ahead...
With Gisholt
Improvements



GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

The Rigidturner

A PROVED METHOD OF TURNING MULTIPLE DIAMETERS

The Rigidturner is a sturdy machine of simple design—adaptable to any type of shaft turning. Economical on both long and short runs due to ease of set-up and automatic operation—operator merely loads work and presses button.

Here's how it works—a disc type form cutter is mounted on the cutter arbor and supported by an outboard support. The work advances by the cutter which is rotated in timed relation to produce different diameters. One complete pass of the cutter completes an operation.

This high production machine has been developed for turning multiple diameter work in large quantities in the minimum of time and maintains close tolerance duplication.

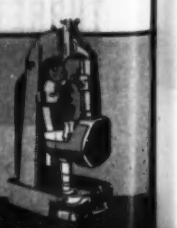
Write for booklet today—it tells what the Rigidturner is—how it works—how it will cut your costs for turning multiple diameter work.

The CLEVELAND HOBBING MACHINE Company

General Offices:
1311 CHARDON ROAD
CLEVELAND 17, OHIO

Chicago Office:
624 S. MICHIGAN AVE.
CHICAGO 5, ILLINOIS

BUILDERS OF RIGIDHOBBERS AND RIGIDTURNERS



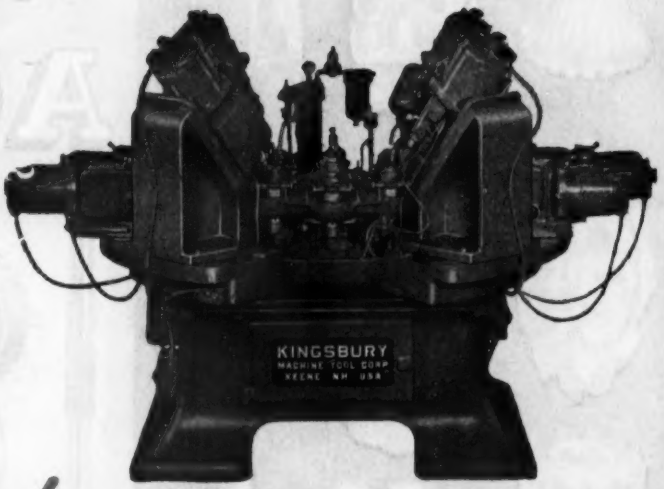
FLEXIMATIC

Demonstrates its Speed and Accuracy on Fuse Part Production

Drilling, counterboring and tapping brass fuse part components—doing the entire job in a single chucking of the work—producing 500 completed parts per hour! Jobs like this, that demonstrate FLEXIMATIC speed, simplicity and accuracy, are the reason why FLEXIMATICS are so widely chosen for intricate operations on munitions parts.

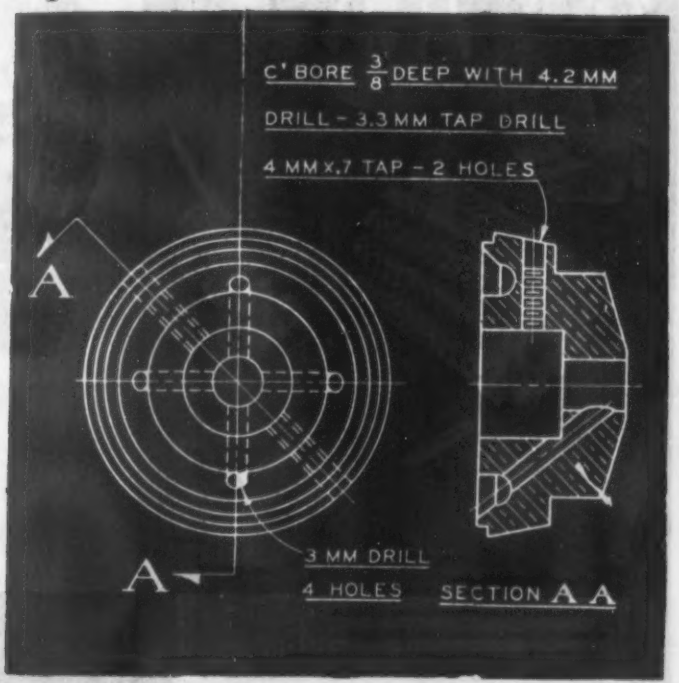
Kingsbury FLEXIMATICS are made up of standard units mounted on one of several types of standard bases. This method greatly lowers the cost of special machine construction and, in addition, permits changes to be readily made to meet changes in production. In the FLEXIMATIC illustrated, individual work holding fixtures in the turret are automatically indexed during the indexing of the main turret, thus presenting the part in various positions at the work stations so that all the operations are performed in a single chucking.

To meet the exacting standards of accuracy and the imperative need for speed in munitions production, choose FLEXIMATICS by Kingsbury!



by KINGSBURY

THIS IS A FLEXIMATIC MUNITIONS JOB!

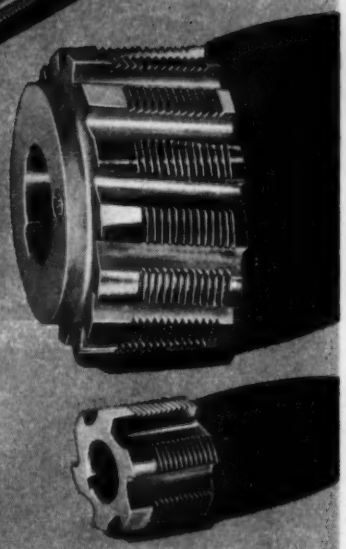


KINGSBURY MACHINE TOOL CORPORATION
KEENE NEW HAMPSHIRE U S A

Greater ACCURACY

SPECIAL MULTIPLE WAY-TYPE PRECISION
THREAD GRINDING, BORING AND LAPPING
UNITS • GRINDING SPINDLES • CONTINENTAL
MENT • R. R. PINS AND BUSHINGS • PURE-PAK

YREQUIRED!



New Production Speeds and Improved Part Finish Place Emphasis on PRECISION-MADE Cutting Tools.

Since 1919 The Continental Tool Works (a division of Ex-Cell-O Corporation) has been producing special and semi-standard cutting tools to customers' drawings or part prints—until today the Continental name in the cutting tool field is commonly used as another word for "accuracy and quality." This long experience, coupled with the most modern and complete facilities, makes Continental the first choice as a cutting tool source for manufacturers planning their re-tooling for tomorrow's huge production. *Find out now how you can be assured of high production efficiency*—get in touch with the nearest Ex-Cell-O representative or write to Continental Tool Works Division, Ex-Cell-O Corporation, Detroit 6, Michigan.

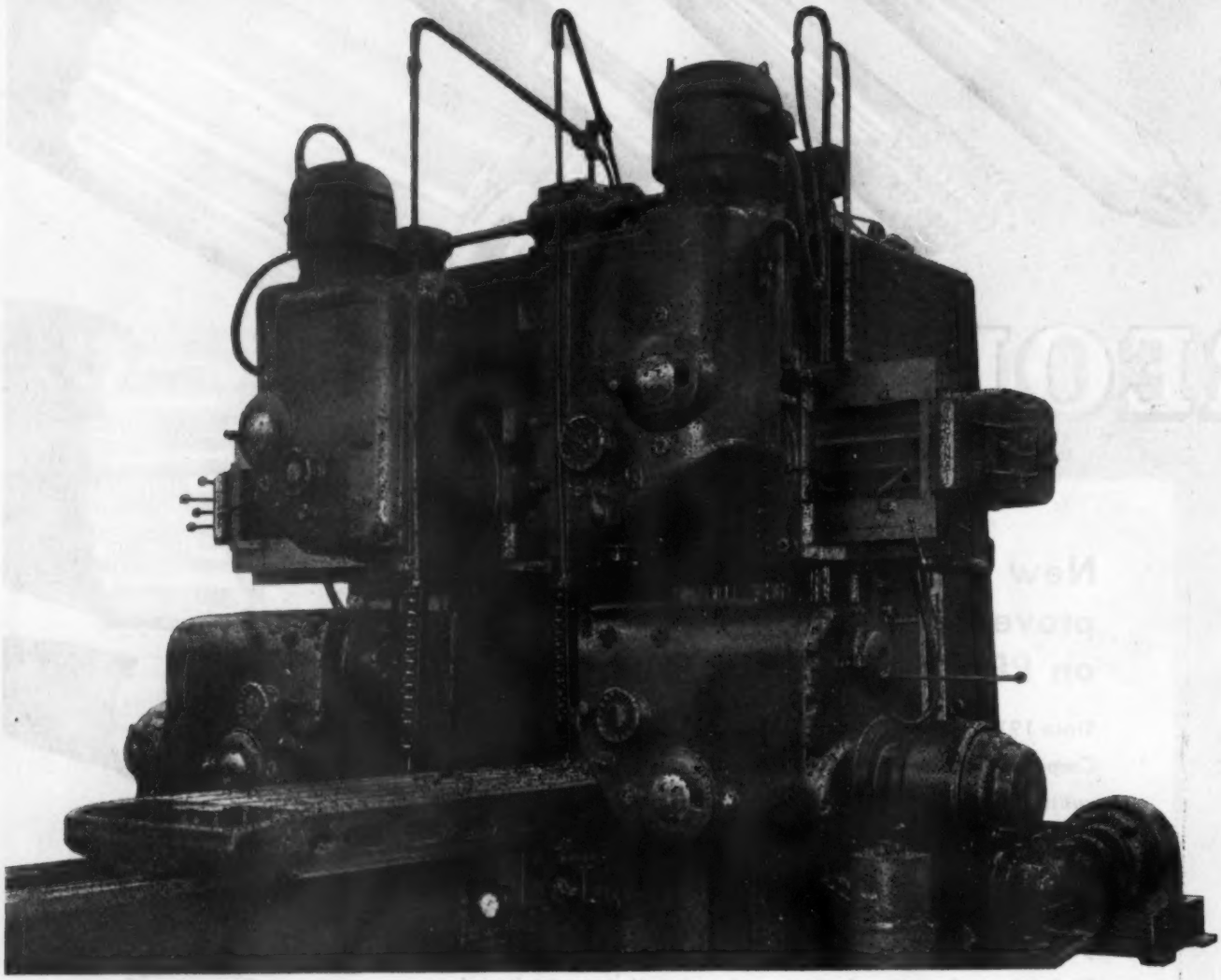
1919 XLO 1944

EX-CELL-O CORPORATION

DETROIT 6, MICHIGAN

BORING MACHINES • SPECIAL MULTIPLE PRECISION DRILLING MACHINES • PRECISION MACHINES • BROACHES AND BROACH SHARPENING MACHINES • HYDRAULIC POWER CUTTING TOOLS • DRILL JIG BUSHINGS • TOOL GRINDERS • FUEL INJECTION EQUIP- PAPER MILK BOTTLE MACHINES • PRECISION AIRCRAFT AND MISCELLANEOUS PARTS

CINCINNATI HYPRO



PLANER TYPE MILLING MACHINE

This 48" x 48" x 14' Cincinnati Hypro Planer Type Milling Machine with 9½" milling heads is machining parts for diesel engines that will drive submarines and surface ships to Victory on five oceans.

The combination herringbone gear drive to the table provides the same smooth power transmission that big ships enjoy through use of herringbone construction of their turbines.

Each head is completely self controlled with the spindle powered by an individual motor. All shafts in the spindle drive are anti-friction bearing mounted. All gearing is of hardened alloy steel mounted on integral multiple splined shafts. Each milling head has a spindle range of from 10 to 200 R.P.M.

The rail provides a solid narrow guide bearing for the saddle which prevents tilting action when cross milling. Cross travel friction is reduced to a minimum by anti-friction roller bearings.

• Write today for Bulletin 1050 which gives a complete illustrated description of this Cincinnati Hypro Planer Type Milling Machine's Hyproduction features.

ARMY E NAVY

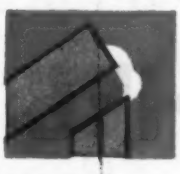
THE CINCINNATI PLANER COMPANY

Planers...Vertical Boring Mills...Planer Type Millers

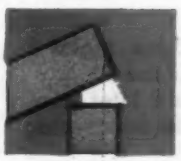
CINCINNATI . OHIO . U.S.A.

arcs leave this point Fast!

A POINT TO REMEMBER!



LIKE THIS. Diamond-pointed break jaws confine arcing to the point . . . force the arc to break outside the current carrying area. Contact surfaces stay clean . . . don't pit, don't burn.



NOT LIKE THIS. When ordinary safety switches are opened, the arc leaps across the contact areas . . . along the jaws and blade. It hangs on longer, burns and pits the contact surfaces.

When arcs hang fire, switch contacts become pitted and burnt . . . cause trouble. To avoid this, keep the arc away from the contact area—*and* put it out *quick!*

Westinghouse Safety Switches do *both.* The diamond-pointed jaw forces the arc to break outside the current-carrying area. Contacts stay clean, last longer, need less care, provide better protection.

For 575 or 600-volt circuits, Westinghouse provides extra protection—the exclusive "De-ion" arc quencher. Arcs are drawn into the grid chamber—divided—quenched quickly!

Protect circuits with Westinghouse Safety Switches. Ratings up to 1200 amps, 600 volts. Call your Westinghouse Representative today. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Dept. 7-N.

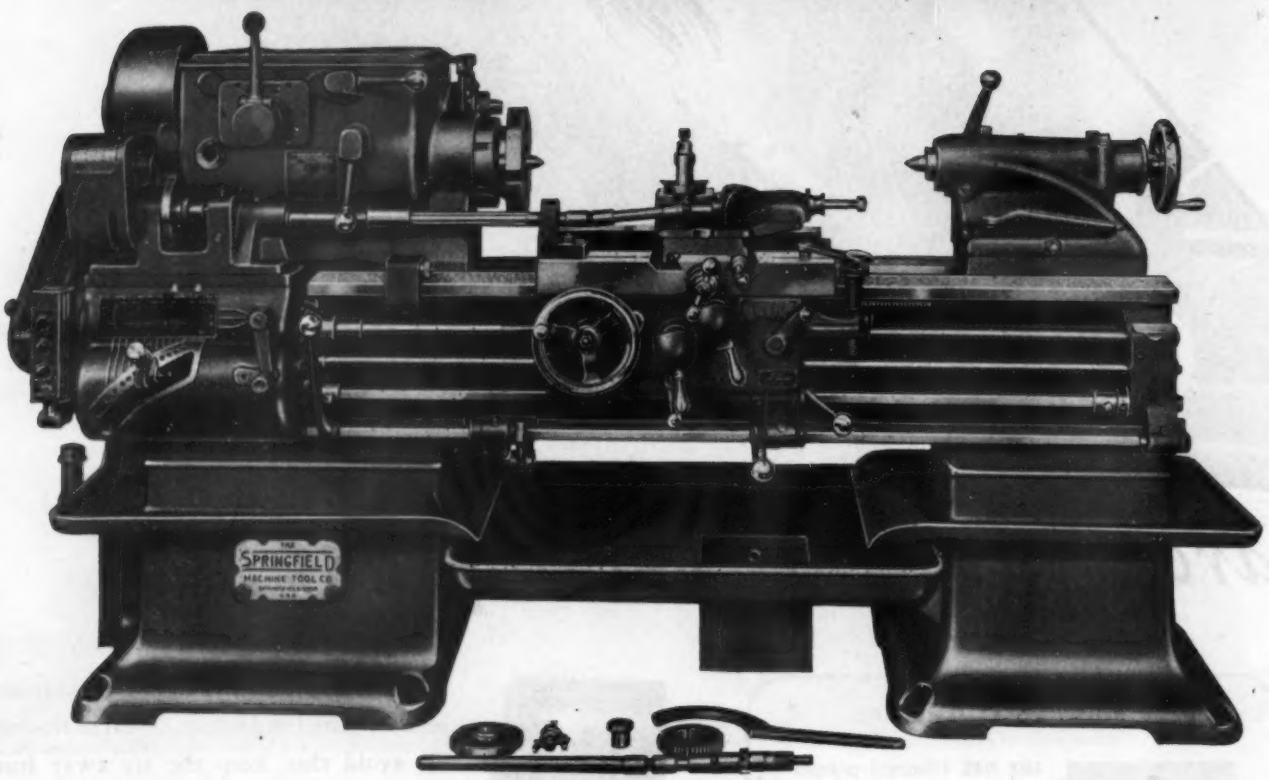
J-21299

Westinghouse SAFETY SWITCHES

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Choose

SPRINGFIELD



GEARED HEAD LATHES

From the ground up, a SPRINGFIELD Lathe represents superior construction and design. All heavy castings, including the bed, are cast in our own shop . . . gearing is designed for maximum efficiency . . . attachments demonstrate unusual engineering ingenuity . . . lubricating systems and power transmission are built to take it, 24 hours a day. In fact, to fully understand what SPRINGFIELDS can do for you, check their superior metal turning records in other shops . . . and judge for yourself.

Under current emergency conditions make it SPRINGFIELD Geared Head Lathe . . . they'll do your job better, now and later, too! Sizes range from 14" to 30". Write concerning deliveries, prices, etc.

The SPRINGFIELD MACHINE TOOL Co.

SPRINGFIELD OHIO U.S.A.

Inserts of WEAR-RESISTANT

KENNAMETAL . . .

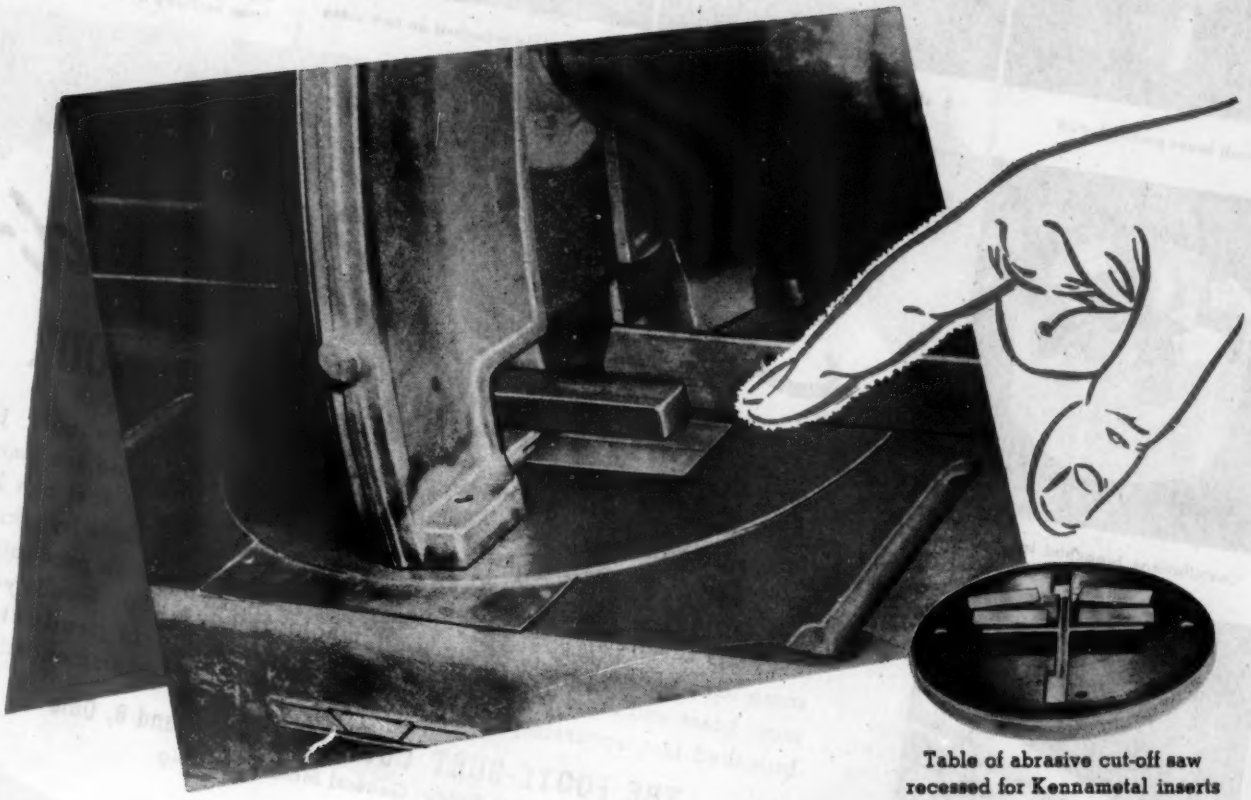


Table of abrasive cut-off saw recessed for Kennametal inserts

CAN OFTEN SALVAGE EXPENSIVE PARTS

. . . AND PROVIDE A NEW SURFACE THAT OUTWEARS THE ORIGINAL UP TO 100 TIMES!

The effective life of many types of machines can be lengthened, and costly shutdowns eliminated, by using Kennametal at strategic points. The illustrations of the abrasive cut-off saw clearly show how standard Kennametal blanks, made primarily for cutting tools, can be used as wear-resistance units. The original surfaces of the saw rest wore quickly, allowing the steel to wobble, causing uneven cut-off. Kennametal inserts, recessed into the table, make a smooth, hard surface of unsurpassed durability.

● The superiority of Kennametal for "specialty" applications comes from a combination of unique properties—amazing hardness (78 Rockwell C), low coefficient of friction, high modulus of elasticity (2 to 3 times that of steel), dimensional stability, and resistance to corrosion and erosion.

Kennametal is available in standard shapes (flat blanks, discs, balls), or it can be accurately molded into special shapes, limited only by reasonable proportions. You can use it profitably in your products, and production machinery. Tell us your wear problem. We will suggest how it may be solved with Kennametal.

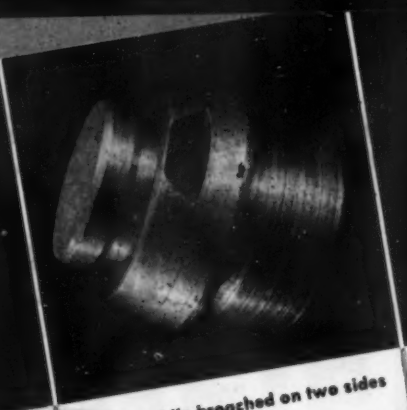
KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., LATROBE, PA.

Small brass part—slotted

5 slots on circumference—one operation



Flats straddle broached on two sides

Automobile door hinge broached from sections of rolled steel stock

Castellations broached in one pass thru machine

Surface Broached—

PRODUCTION...2000 PIECES PER HOUR

★ Keen competition in forthcoming days will require the high production machining rates that are possible with surface broaching. The few parts illustrated will give you some idea of the variety of aluminum, brass and steel parts that are broached fast, accurately and with a low tool maintenance cost. In hundreds of plants there are many parts being produced that can be more economically made by taking advantage of this high production machining method. Send your prints and hourly production required for our recommendations.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building

Both ends of shackle pin squared using index fixture

Hexagon broached on spark plug body

Flat broached on side of fuse body

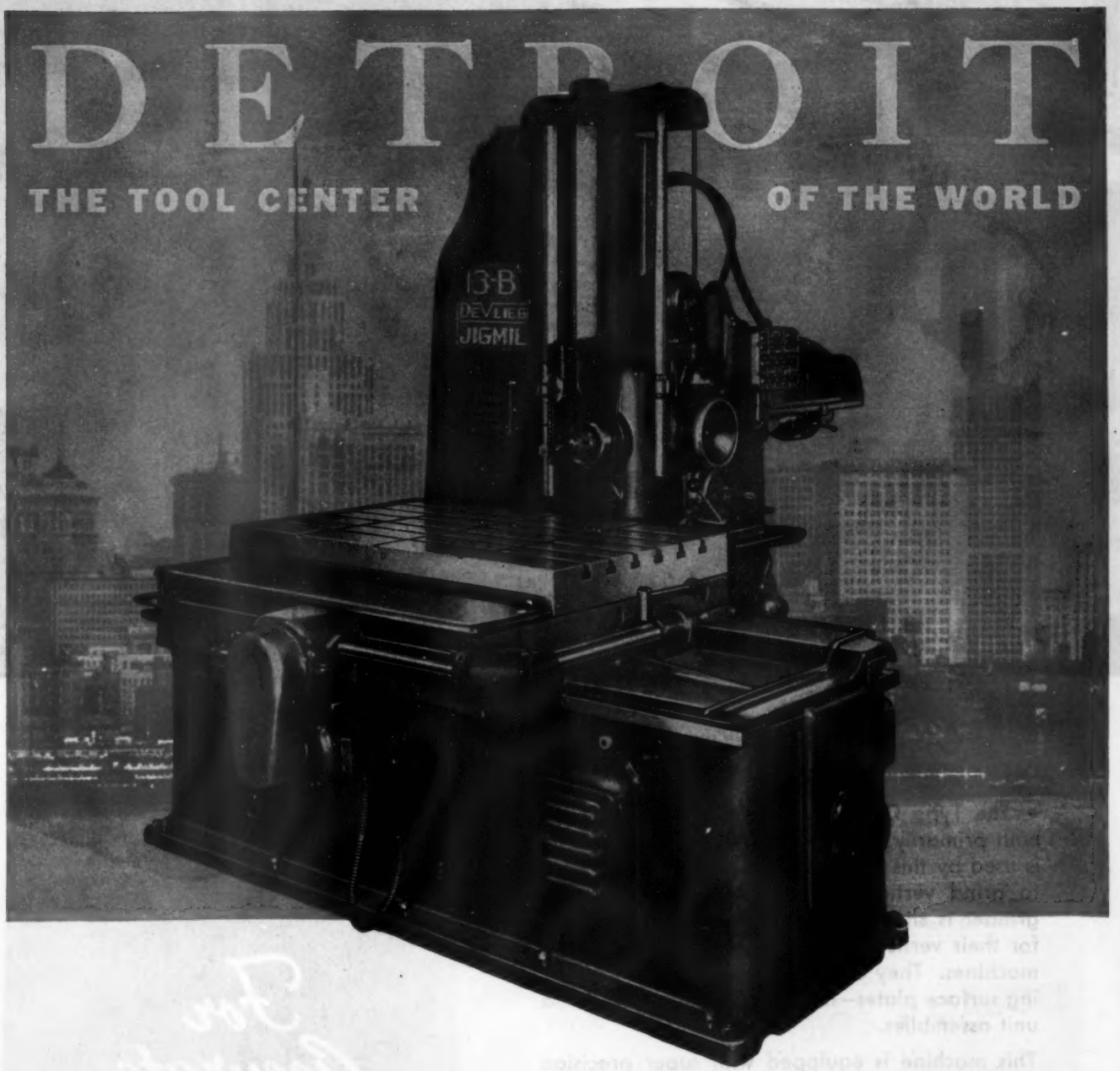
Flats straddle broached on two sides of bushing

Key slot breached lock tumbler

MOVE UP THE SCHEDULE ☆ WIN THE WAR QUICKER

Footburt Patented Tooth For

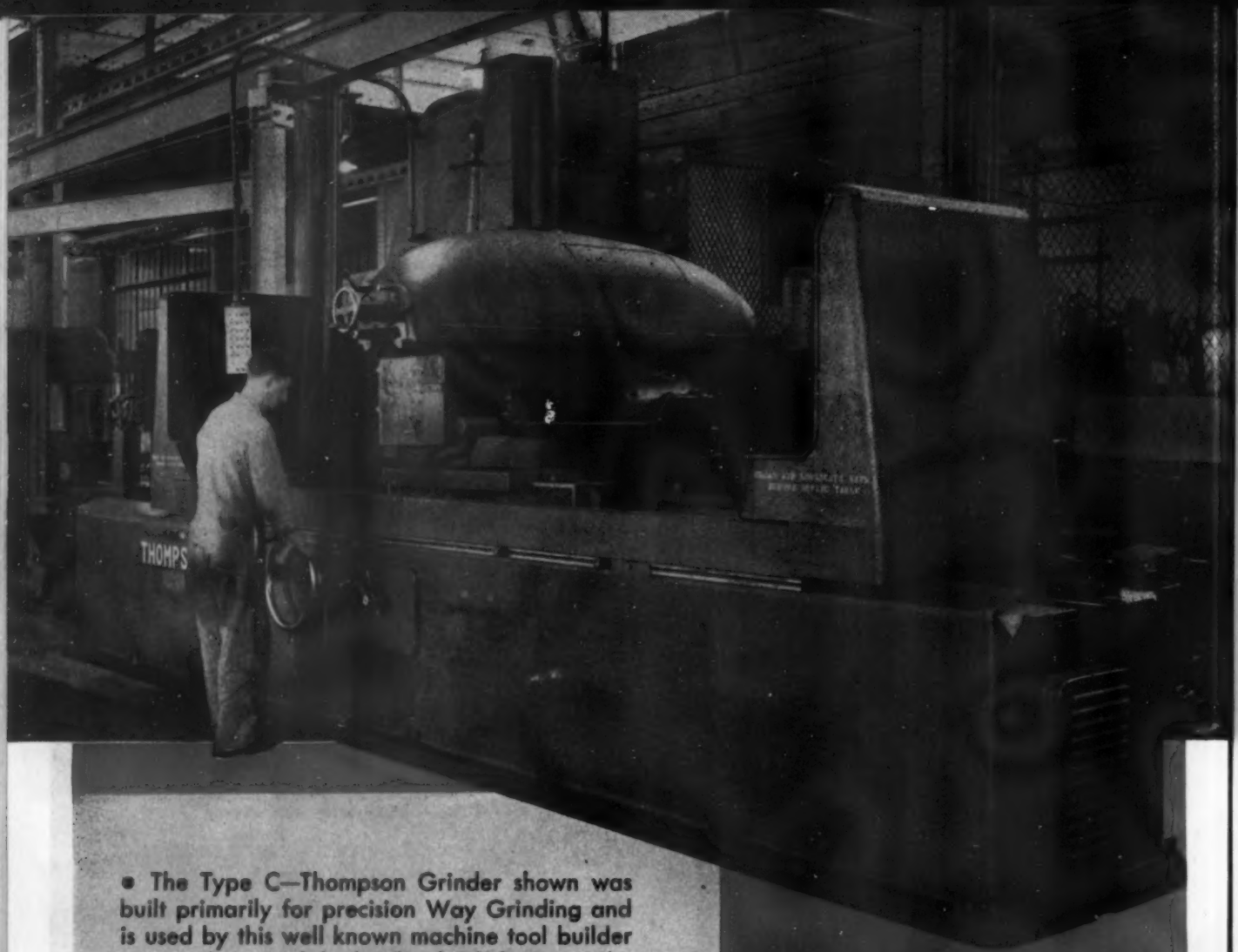
FOOTBURT *Surface Broaching*



The World's Finest BORING and Milling Machine is made in Detroit

This new Model 3-B JIGMIL has automatic power means to position the spindle from one location to another accurately to within much less than .0001 (one-ten-thousandths part of an inch). Thus, extreme laboratory accuracy is conveniently available with ordinary skill that would normally make such precision very high in cost. This, and many other refinements, go further to prove that the JIGMIL idea is a totally new approach to the problems of precision boring at a new low cost.

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**



• The Type C—Thompson Grinder shown was built primarily for precision Way Grinding and is used by this well known machine tool builder to grind vertical hydraulic feed frames. The grinder is shown grinding flats on the saddles for their vertical and horizontal hydraulic feed machines. They also use the machine for grinding surface plates—fixture mounting plates—and unit assemblies.

This machine is equipped with super precision pressure lubricated spindle bearings designed for way grinding application—a smooth, shockless hydraulic table drive with infinite speeds available from 10 to 100 feet per minute. The result is a fast, cool cutting operation causing less distortion in the work as lighter cuts are taken at high speed. It also results in a smoother, more accurate finish of the surface ground.

For dependably smooth, precision grinding put your work on a Thompson Hydraulic Grinder.

Furnished in a full range of types and sizes from 6 x 12 x 18" to 36 x 36 x 240". Write for Bulletin.

For Accurate Smooth Way Grinding

THOMPSON GRINDERS

THE Thompson GRINDER CO.

SPRINGFIELD, OHIO

talent

The inventive genius reflected in the wartime product of the Vulcan tool designer is not the accidental flash of occasional inspiration. It is the professional touch of an organization that has made tools a profession.

It rests upon the same foundation of hard work and training that marks the renditions of a professional musician. He began playing younger than most, he practiced more constantly, he trained under a variety of teachers, he played with skilled associates, and he lived, breathed and loved his vocation.

Vulcan began special tool making thirty years ago. It has never done anything else. It has learned the things that can only be learned by serving a variety of industries. It has teamed with top flight firms in their respective lines. It is staffed with career designers for whom creating is the breath of life. The best time to get better acquainted is now!

ENGINEERING

DESIGNING

BUILDING

TOOLS • DIES

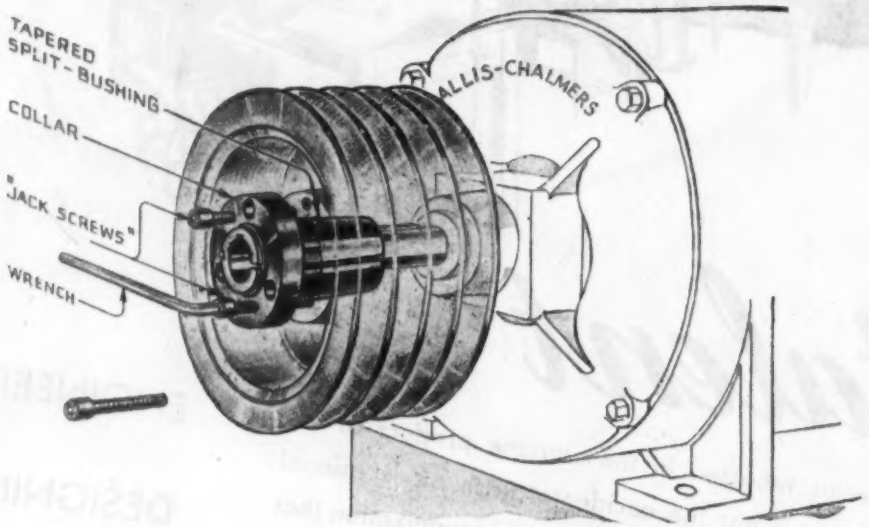
JIGS • GAUGES

SPECIAL

MACHINERY

X-Ray View

OF ALLIS-CHALMERS' NEW "MAGIC-GRIP" SHEAVE



Fastest mounting and demounting sheave on the market, the new "Magic-Grip" costs you nothing extra.

1 **Remove three capscrews** from bushing collar. A handy wrench — supplied with each sheave — is the only tool needed to remove Allis-Chalmers' new "Magic-Grip" from motor or machine shaft quickly and easily.

2 **Insert two capscrews** in tapped holes. As screws are turned, they become levers . . . automatically breaking tight grip of tapered split bushing on sheave and shaft. Entire unit is then ready for removal.

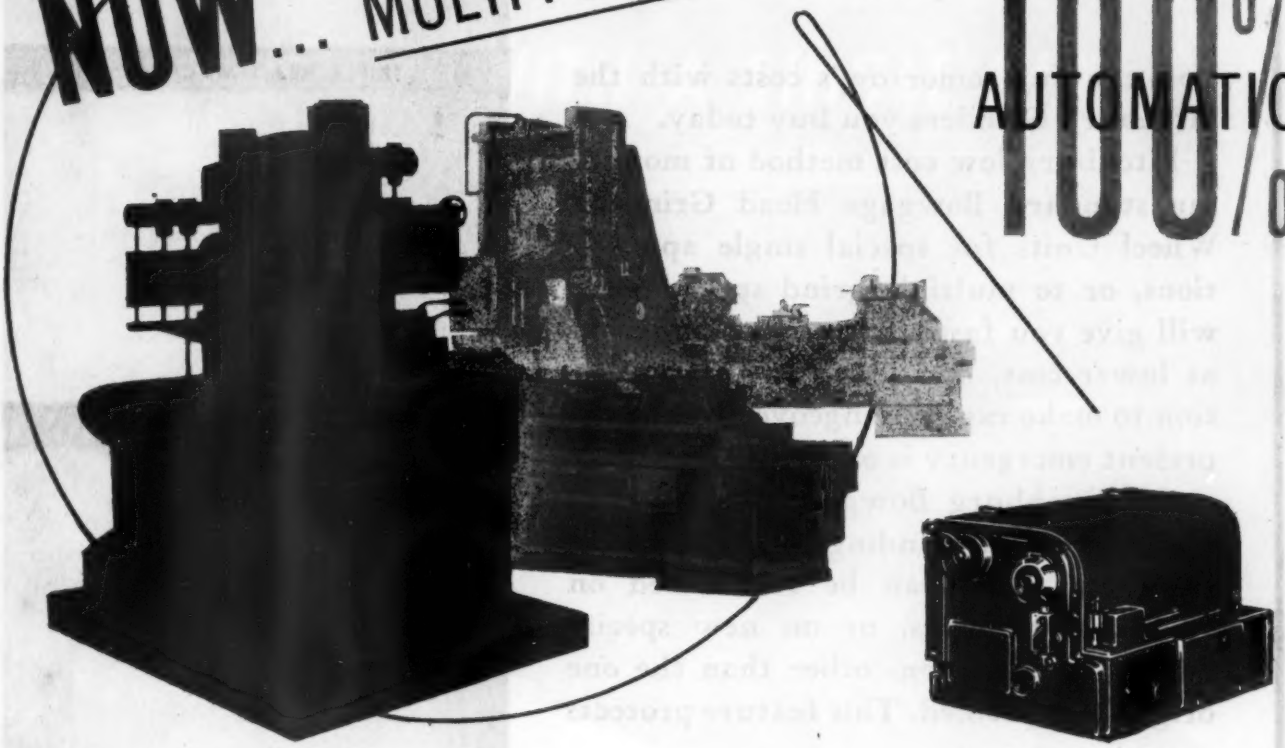
3 **Remove sheave from shaft.** Requires no mallet, no prying, no bulging muscles. You just slide the sheave off . . . smoothly, quickly. *It costs nothing extra!* Send for B6310. Allis-Chalmers, Milwaukee 1, Wis.

A 1770

Allis-Chalmers Texrope

"MAGIC-GRIP" **SHEAVES**

NOW... MULTI-PURPOSE MACHINES CAN BE 100% AUTOMATIC



A *revolutionary new production principle makes automatic control as versatile as manual control*

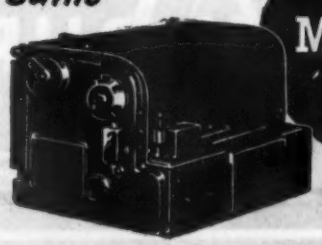
The Bullard "MAN-AU-TROL" principle of automaticity focuses at a finger tip the ability to get out of a machine anything that man's mind and muscles can get out of it . . . without human or cumulative error.

Applied to a machine this principle would make possible the production of one part as long as required with continued accuracy . . . *then in a few hours, not days* . . you could reset the control to turn out an entirely different part . . . any size, any shape within the machine's limits.

So you see, the Bullard "MAN-AU-TROL" combines, for the first time, the greater production and lower costs of special-purpose automatic machines with the multi-purpose advantages of manually operated machines . . . *plus* manual operation at a moment's notice.

The Bullard Company, Bridgeport 2, Connecticut.

The automatic control that is as versatile as manual control



BULLARD
MAN-AU-TROL
MASTER OF THE MACHINE

100% automaticity... no human or cumulative error... control to closest tolerances — *a tremendous cost advantage in competitive markets!*

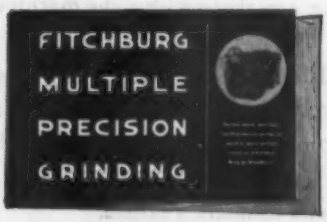
WHAT ABOUT *TOMORROW'S GRINDING COSTS?*

You can cut tomorrow's costs with the Fitchburg Grinders you buy today.

Fitchburg low cost method of mounting standard Bowgage Head Grinding Wheel Units for special single applications, or to multiple grind special jobs, will give you faster wartime production at lower cost, and leave you in a position to make rapid changeovers when the present emergency is over.

All Fitchburg Bowgage Head Automatic Precision Grinding Wheel Units are standard. They can be remounted on standard machines, or on new special bases, for operations other than the one originally specified. This feature protects your investment.

Save time and money — speed up cylindrical production grinding with Fitchburg Bowgage Heads.



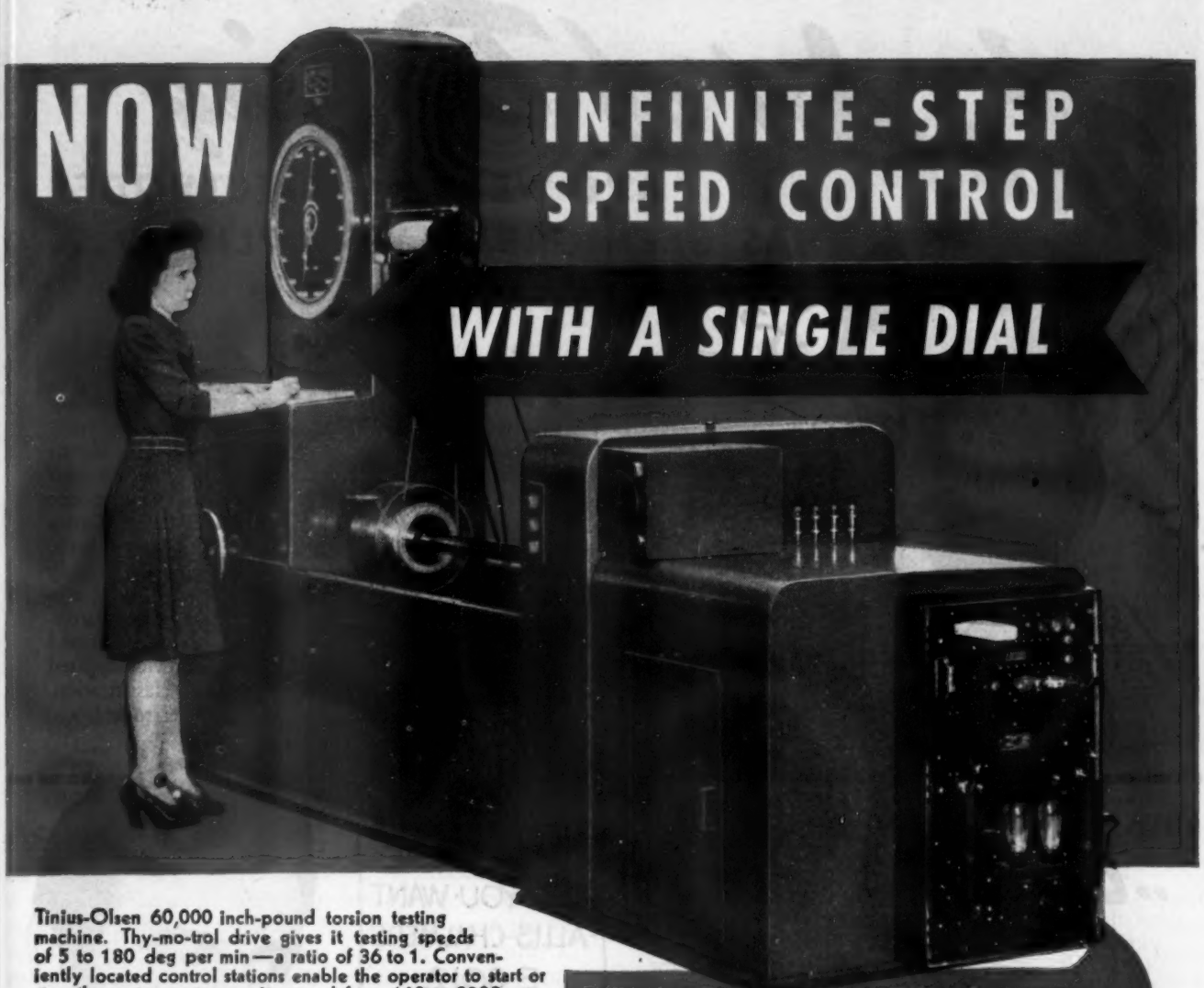
This Book shows how to cut grinding costs. . . . Free to executives. . . . Write for it today.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Both Full Universal Grinders and Special Purpose Grinders

NOW INFINITE-STEP SPEED CONTROL WITH A SINGLE DIAL



Tinius-Olsen 60,000 inch-pound torsion testing machine. Thy-mo-trol drive gives it testing speeds of 5 to 180 deg per min—a ratio of 36 to 1. Conveniently located control stations enable the operator to start or stop the motor, or to vary its speed from 160 to 2300 rpm. Note that everything else required to control the motor is contained in a single panel (here shown with cover removed), which illustrates how easily Thy-mo-trol drive can be applied on machines.

Made Possible by THY-MO-TROL DRIVE

BY means of Thy-mo-trol drive, machine operators can select exactly the right speed for each job, and often they can do a wider variety of work because of the extremely wide speed range that is possible. Speed adjustment—in an infinite number of steps—is provided by a single potentiometer. It is so arranged that it adjusts armature and field voltages correctly to obtain motor-speed ranges as wide as 100 to 1—or greater if required.

What Thy-mo-trol Drive Is

Thy-mo-trol drive consists of an electronic panel, d-c motor, power transformer, and control station. It takes a-c power from your supply line and, through its d-c motor, delivers torque to your load. The electronic panel starts, accelerates, controls the speed, provides dynamic braking for stopping, and reverses the motor. *Standard* drives can be obtained from 1/8 to 20 hp.

Five OTHER Advantages

1. Operates from a-c power
2. Constant speed under changing load
3. Smooth, fast constant-current acceleration
4. Low maintenance
5. Speed can be preset before starting

How to Buy Thy-mo-trol

Just give our nearest G-E office complete information about your requirements—nature of the load, speed range, horsepower, etc. Our engineers will select the right Thy-mo-trol drive to give you exactly the operating characteristics you want. *General Electric Company, Schenectady 5, N. Y.*

BUY WAR BONDS

DO YOU HAVE THIS BULLETIN?

General Electric, Section F668-15
Schenectady 5, N. Y.

Please send me a copy of Bulletin GEA-4025, "Adjustable Speed Electronically with Thy-mo-trol Drive," which tells what Thy-mo-trol will do, and how it works.

Name.....

Company.....

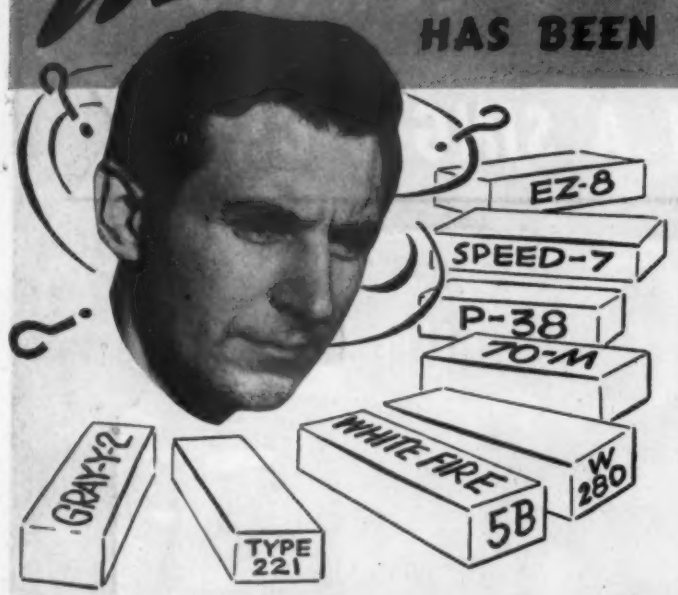
Address.....

.....

GENERAL ELECTRIC

The Art of Buying

ARC WELDING ELECTRODES HAS BEEN GREATLY SIMPLIFIED...



It used to be.. a puzzling situation — those electrodes with confusing trade names and trade numbers. Each manufacturer's identification system was different, each one had his own special name for electrodes. Thus, for example, one particular rod designated by American Welding Society as E-6012 had over twenty different trade names. And no two trade names were even vaguely similar. To a welder selecting a certain rod for a definite job these varying trade names were disconcerting. They had *no* connection with any standard welding classification. Unless he had previously used the rod or took time to check into its classification, he was at a loss to select the correct electrode.

..But now Allis-Chalmers has cut through this mass of confusion and greatly simplified the business of buying electrodes. Official *AWS classification numbers* have been adopted for Allis-Chalmers electrode identification. Thus *AWS E-6012* becomes *Allis-Chalmers E-6012* in the A-C electrode line. It's logical and practical. Correct selection is automatically assured.

Shop-tested and production-proven in A-C's own huge plants, these electrodes are available now at Allis-Chalmers welding dealers and district offices. Write for bulletin B6340. A 1780

ALLIS-CHALMERS

MILWAUKEE 1, WISCONSIN

HEADQUARTERS FOR WELDING EQUIPMENT

AMPAC A-C WELDERS

WELD-O-TRON D-C WELDERS

ALLIS-CHALMERS ELECTRODES

ARC WELDING ACCESSORIES

Tune in the Boston Symphony, Blue Network, every Saturday at 8:30 pm, EWT.

NEW WELDING CONTROL

New CR7503-C110 welding control. Inset shows the master control station, which can be removed for mounting on the welding machine.

Accurate timing · Smooth heat adjustment · Fully electronic

As this control is of the synchronous-precision type, it provides the accurate repetitive timing, even with instantaneous or sustained line-voltage variations, so essential to highest-quality welding. This control, the most versatile of all G-E resistance-welding controls, is not only ideal for the types of work given below, but it can also be used where it is desirable to do all three types of work on one machine.

Spot or Pulsation Welding

This control is particularly well suited for these two types of welding because of its wide timing range. It can be used in the welding of thin-gage metals where consistent timing of as low as one or two cycles may be required, in the welding of heavy-gage metals or in projection welding where pulsation welding may be required, or in special welding applications where pulsation welding may be required with a minimum heat and cool time of one or two cycles.

The timing range in spot welding is from 1 to 30 cycles.*

In pulsation welding, heat and cool time, are independently adjustable from 1 to 30 cycles*, and the impulse-counting circuit is adjustable from 1 to 15 impulses—independent of heat or cool time settings. *When used on a 60-cycle power supply.

Seam Welding

Good seam welding is possible with this control because the accurate timing circuit and the independent adjustment of heat and cool time (in complete-cycle steps) eliminate timing variations and transient currents. Heat and cool time are independently adjustable from 1 to 30 cycles*.

Heat Control on All 3

Smooth heat adjustment is provided by the phase-shift method of heat control. This eliminates the need for many heat points on the welding transformer. In addition, a voltage- or current-regulating compensator can be added by simple interconnections. Also, this welding control when equipped with a tempering attachment makes possible good results in the spot welding of thin-gage air-hardenable steels.

*When used on a 60-cycle power supply

Send This Coupon for Your Copy of Our New Bulletin

General Electric Company, Section A645-33
Schenectady 5, N. Y.

Please send me a copy of your new bulletin (GEA-4220). I'd like more information about this new welding control.

Name.....

Company.....

Address.....

.....

8960

Buy all the BONDS you can—and keep all you buy

GENERAL ELECTRIC

G&L PRODUCTION FACTS

on a typical job

1 Eight Hours Production Time Saved

2 Accuracy Improved

3 Two Set-Ups Eliminated

4 Layout Eliminated

5 Two Machines Replaced

1 Present floor-to-floor machining time on this cast semi-steel housing is 9½ hours. Formerly the same job on a vertical lathe and drilling machine required 17½ hours. The G. & L. Horizontal Boring Machine saves eight hours on each casting machined.

2 Two set-ups were required to face and bore this casting on a vertical lathe. The housing is now mounted on a plate or base which in turn is clamped to the horizontal boring machine table. Instead of unclamping the work, the part and base is turned 180° for facing and boring operations.

3 Because all boring, milling, drilling and tapping operations are completed before the work is unclamped, overall accuracy is greatly improved. Bored and drilled holes and milled surfaces are always in correct alignment with each other.

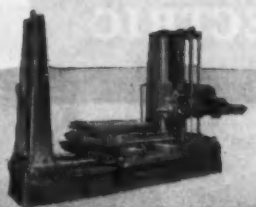
Eight hours saved in machining this semi-steel housing.

4 Layout is not required before the casting comes to the machine. All holes are drilled using the machine scales and verniers for correct hole location. Drilling and tapping operations are simplified.

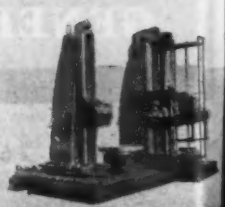
5 The G. & L. Horizontal Boring Machine replaced a vertical lathe and a drill press. Production was increased and machining costs were reduced for unnecessary work handling was eliminated. Drilling and tapping operations are performed on the horizontal mill without disturbing original work setting.

GIDDINGS & LEWIS

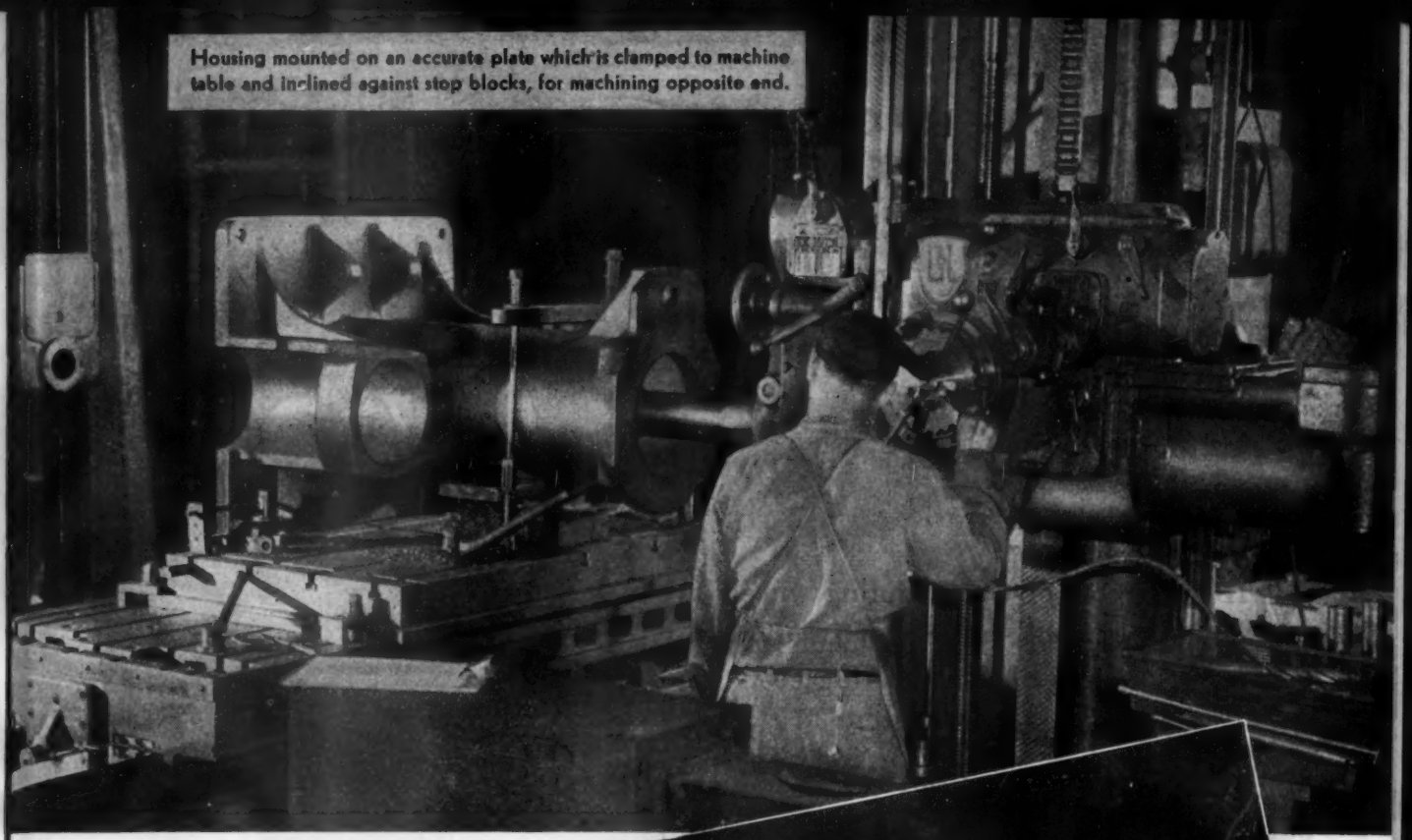
138 DOTY STREET



Right: G. & L. Table Type Machine.

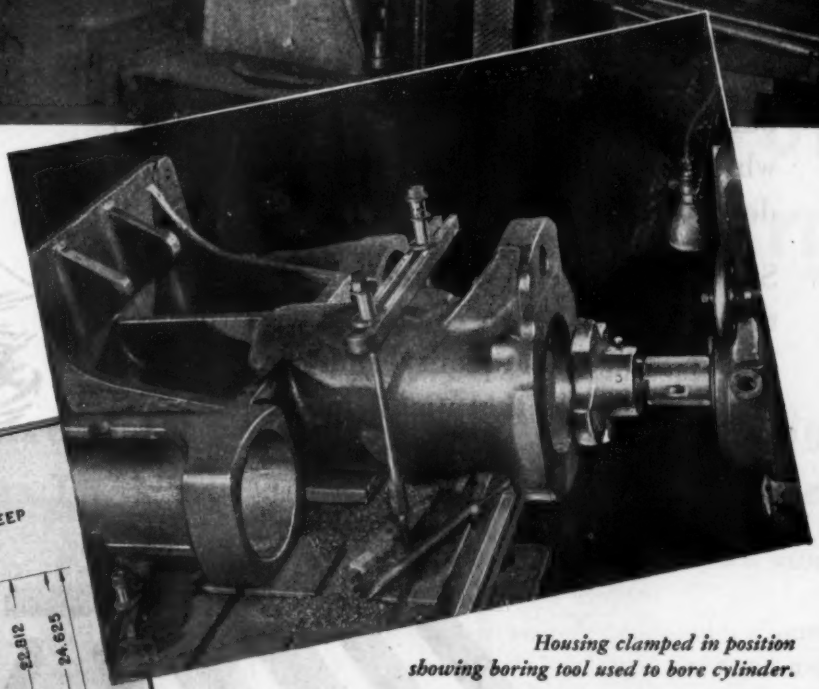


Right: G. & L. Floor Type Machine.

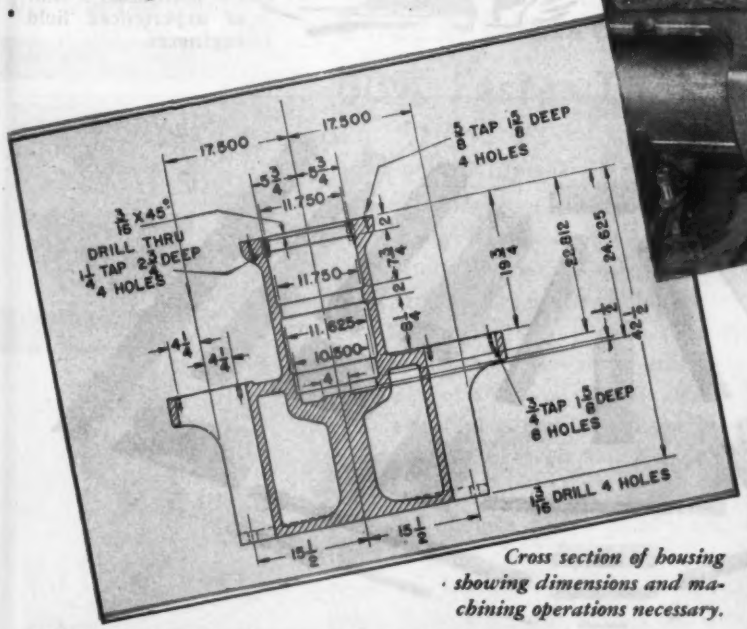


Housing mounted on an accurate plate which is clamped to machine table and inclined against stop blocks, for machining opposite end.

Now is the time to analyze your own production methods. You may be able to make similar savings with the G. & L. Horizontal Boring Machine. Our staff of experienced engineers will be glad to help you with your machining problems. There is no obligation for this service, merely submit the problem.



Housing clamped in position showing boring tool used to bore cylinder.



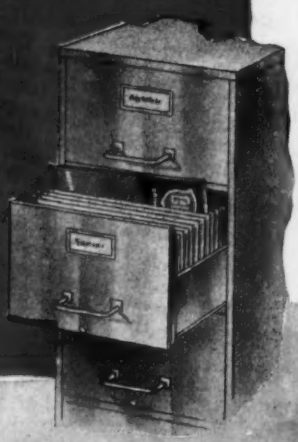
Cross section of housing showing dimensions and machining operations necessary.

MACHINE TOOL CO.

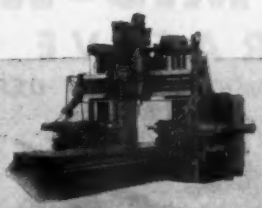
FOND DU LAC, WIS.

Additional Data

...covering the complete line of Giddings & Lewis machines and time-saving accessories is included in this catalog. Write for your copy today—please indicate your business connection. Ask for Bulletin AM-104



Left: G. & L. Planer Type Machine.



Left: G. & L. Multiple Head Type Machine.

TOO TOUGH FOR ORDINARY WHEELS

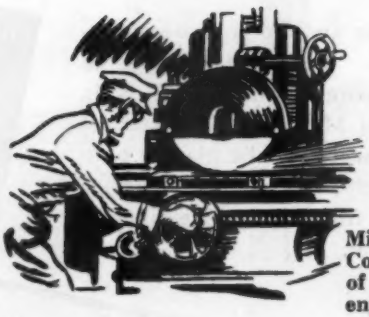
MID-WEST Super-Cut

TAKES IT IN STRIDE

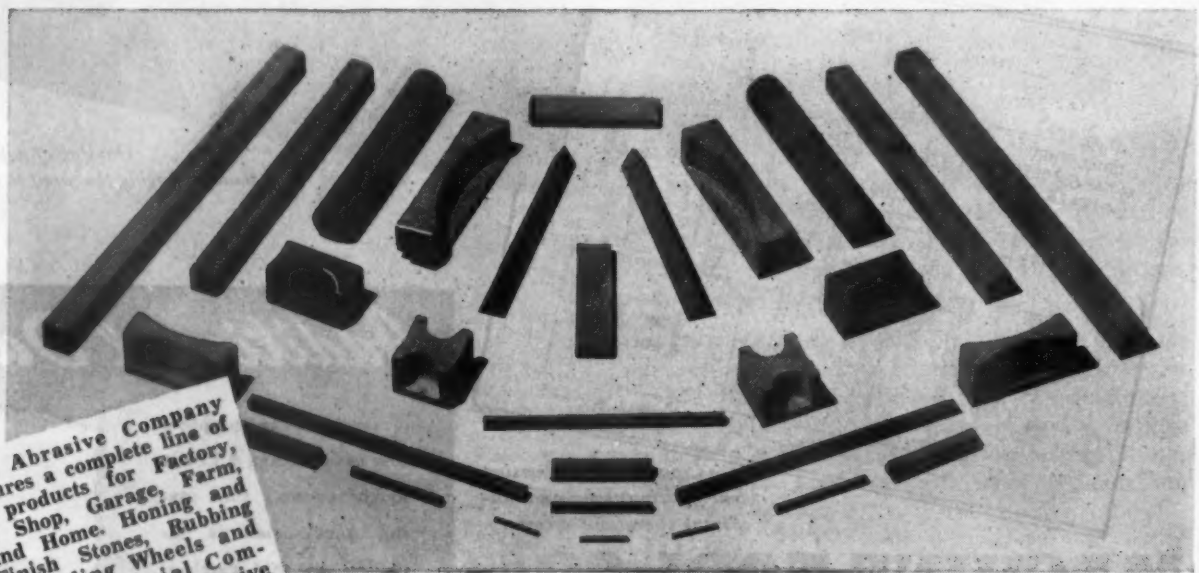
MID-WEST Super-Cut grinding wheels are unusually cool cutting—virtually eliminating all hazards of over-heating costly and irreplaceable tools.

Mid-West Super-Cut wheels are made with our No. 2 grain (special aluminum oxide) which provides the necessary ruggedness for dependable performance and longer life.

Super-Cut wheels cut remarkably fast, and this advantage when combined with the well known Mid-West quality and careful workmanship insures the utmost in efficiency and economy.



Mid-West Abrasive Co. maintains a staff of experienced field engineers.



Mid-West Abrasive Company manufactures a complete line of abrasive products for Factory, Machine Shop, Garage, Farm, Office and Home. Honing and Super-Finish Stones, Rubbing Bricks, Grinding Wheels and Sand Papers—Special Compounds and many other Abrasive Specialties. Jobbers and Factory Representatives located throughout the United States.

DETROIT 11, MICH.

MID-WEST ABRASIVE COMPANY

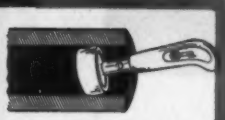
1960 E. MILWAUKEE AVENUE

Manufacturers of DEPENDABLE Abrasives

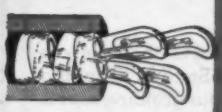
STANDARD

TeBo Gages

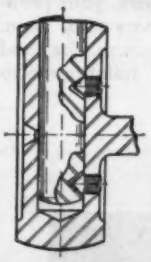
NOW produced in America for American Industry



ONE OPERATION
Checks Minimum and Maximum Tolerances



REVEALS BORE CONDITION AT ANY POINT



ADJUSTABLE FOR CHANGE OF TOLERANCES

Check Bores in ONE Operation More Accurately, 60% Faster Than Conventional Type Plug Gages

TeBo GAGES, long the favorite bore checking instruments of Swedish and other European precision workers, are now produced by Standard Gage Company. Considered by users the most desirable fixed limit type gage, TeBo can make a tremendous contribution to precision in American mass production. It performs, in *one* operation, the several functions required of plug gages, with an ease and accuracy that is a revelation to expert craftsmen.

With TeBo Gages, both minimum and maximum limits may be checked in *one* operation. They reveal the internal conditions of the bore at any point, indicating such factors as out-of-round, taper, belling, as well as dimensional deviations. They can be used with equal accuracy in soft as well as hard metals. May be used in thin walled bores without risk of distortion.

The chromium plated TeBo Gage head is a section of a true sphere, the ideal shape for internal gaging. It passes through a bore freely, without jamming or forcing. A spherical projection controls maximum tolerance measurements. Standard Gage has added adjustability to this projection by means of two ingenious set screws.

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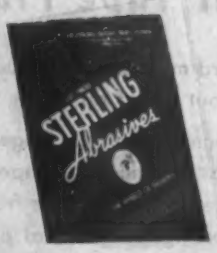

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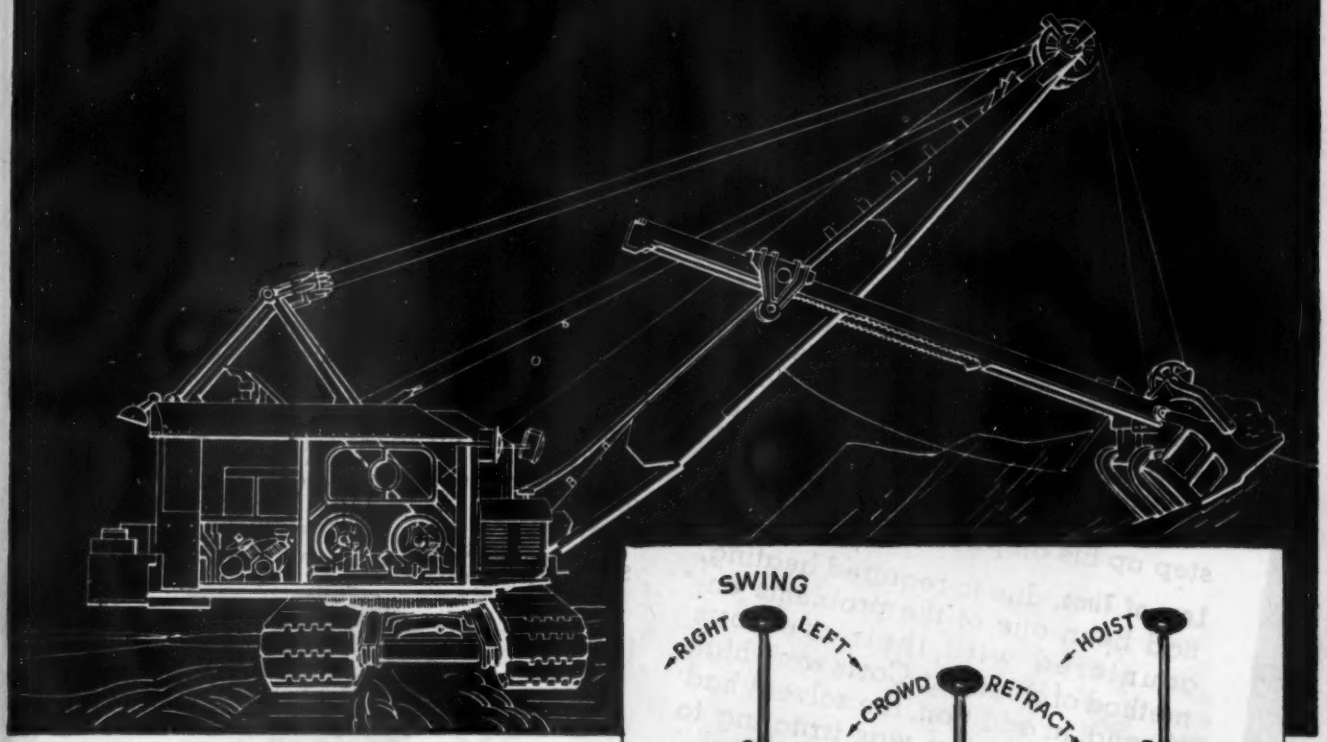

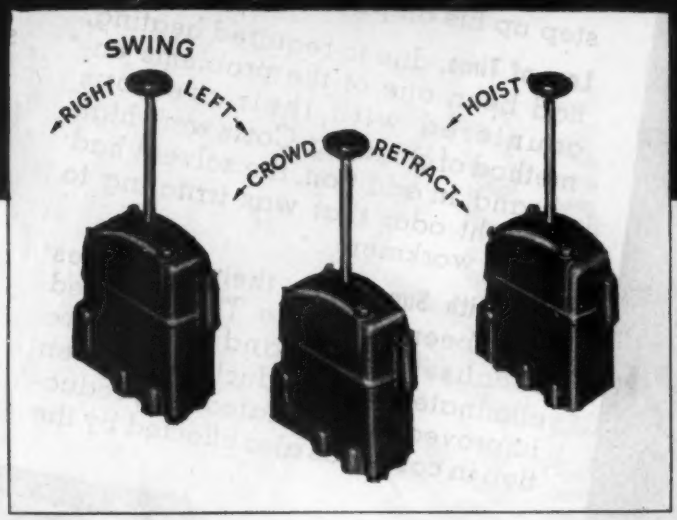

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Impressions of Britain at War

DURING MY PLANE trip across the North Atlantic I had tried to prepare myself for what I would find in a country where the war is virtually on one's doorstep. Nevertheless, the signs of war all about and the grimness of London came as a shock.

This great city still has a dimout darker than New York's practice blackout. Soldiers and military vehicles are everywhere. The second terrifying blitz of the war is just ending and evidences of its devastating effects are plentiful. The British are vastly proud of their own airborne troops at Arnhem, but the tough experience there has merely deepened the conviction of the people here that the German phase of the war may not end this fall.

One point is clear. Americans should dispel any thought that the British will give only lip service or token assistance in the Pacific after the Nazis are knocked out.

Britain intends to carry on as an equal partner with us in proportion to her military and naval strength. All the logic points to that fact—her own possessions and heavy commitments in the Far East, her desire to be in a position of influence later on in settling the ownership of territory and in determining policies there. If anything, her stake in the Pacific is larger than ours.

In America the complaint is that the government is doing too little to get ready for a sudden termination of hostilities and that the problems of reconversion are being sidetracked unnecessarily. The same kind of criticism is heard here about the British Government's lack of action.

The fact is that while everyone in London recognizes that it is imperative for Britain to increase sharply her export trade after the war, nothing much is being done at the moment to give substantial support to such a policy. The government has consistently frowned upon any diversion of manpower and materials for postwar purposes.

Manpower is Britain's tightest and most precious possession, and all of it is needed for the armed services, for war industries and for other things that help keep the country going. Mobilization back home is nothing compared with mobilization here.

Because Britain is so wound up in the war effort, it will take a relatively long time to unwind and get back into normal peacetime pursuits. That, plus Britain's important future contributions to the Pacific war, is why reconversion of industry to civilian goods production is likely to be a slow process. It is why Britain is a bit fearful that demobilization and reconversion in America may be faster and perhaps at her expense in world markets.

After five years of it, the British understandably are sick and tired of war. The people are fatigued; London looks drab because paint and repairs have been impossible. But there persists an amazing cheerfulness, an admirable fortitude, a notable courtesy to each other and to visitors, and a determination to get the job done.

Thoughts of what is to come after the war fade into the background compared with the desire to concentrate to the exclusion of everything else upon the task of winning the war as quickly as possible.

There is no better example of what I mean than a war plant where production was interrupted recently by a serious incident. Instead of being sent home, the employees, both men and women, wanted to stay and help clean things up so that they could get on again with their war duties. The result was that the plant was operating within a matter of hours.

That sort of attitude is not unusual over here where invasion was a serious threat a few years back and where people are too familiar with bombs and "doodle bugs." It is typical of the spirit of Britain in her sixth year of war.

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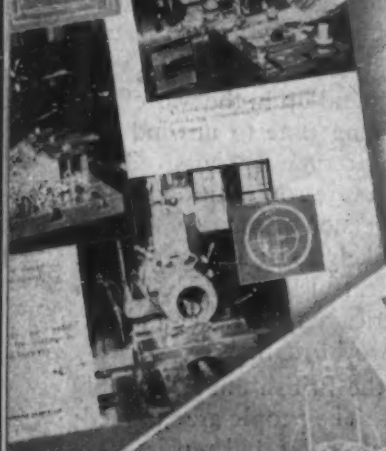

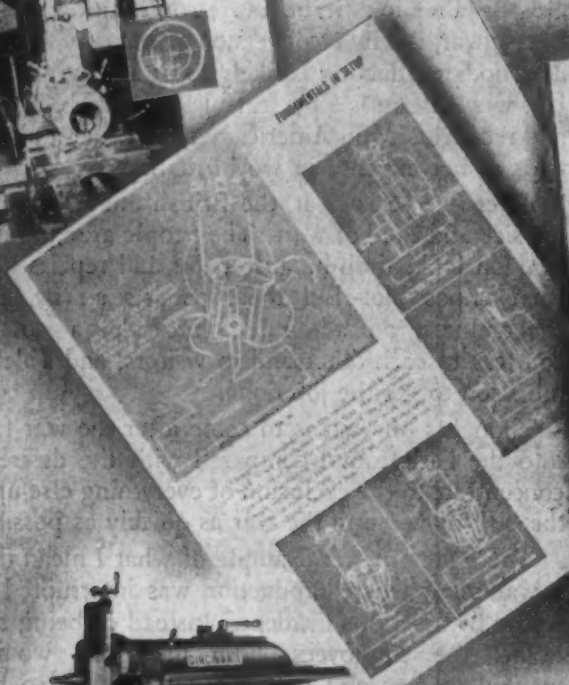

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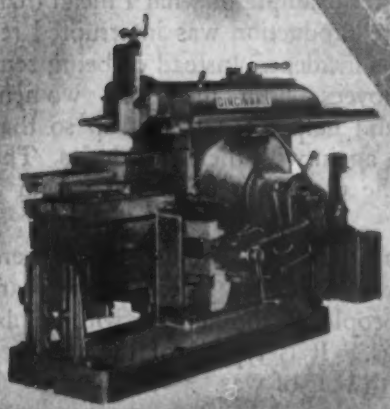

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Plastic Masters Assure Accurate Checking of Assembly Jigs

BY RUPERT LE GRAND, ASSOCIATE EDITOR, AMERICAN MACHINIST

Cast-plastic replicas of lofted aircraft subassemblies need not be stored under controlled temperature and humidity conditions in order to be certain that they retain dimensional stability

FOR OVER A YEAR the Niagara Frontier Division, Bell Aircraft Corporation, has been developing applications for cast resins to production tooling—drill jigs, inspection fixtures for assembly jigs, form blocks, forming fixtures. These cast resins (Catavar phenol-formaldehyde), enable the shop rapidly to produce tooling that is dimensionally stable under varying conditions of temperature and humidity. Often the cost and time savings are impressive.

Many of the drill jigs used in aircraft-parts production are relatively simple. Instead of designing such jigs and then having them made in the toolroom, Bell Aircraft has found it expedient to hand a lofted part to the plastic tool department. Main components of the jig—body, leaf, bushing plate—are quickly produced by casting the resin in simple plaster molds. The cast items are assembled, the lofted part is clamped in position, and the bushings are permanently positioned by the following method: (1)

With the plastic inspection fixture in the leading-edge assembly jig, it is the work of but a few minutes to discover any wrack or misalignment. Not only must the plastic "plug gage" fit snugly against all station members, but the dummy main beam, or clamp, at top must seat properly

Production of cast-plastic inspection fixtures starts with a male plaster pattern built to the outside of the skin. Station templets (shown) are set up on a table, the gaps are filled with a burlap and wire framework, and plaster is applied to 2-in. depth. The contour is obtained by drawing a straight-edge over the templet edges

PROPERTIES AND CURING OF CAST RESIN (Catavar 101)

Curing cycle:

Period 1—12 hr. at 155 F.
Period 2—12 hr. at 165 F.
Period 3—12 hr. at 172 F.
Period 4—sufficient number of hours at 176 F. to achieve the desired strength, as revealed by test samples. Optimum molding temperature 176 F. Total curing time, 72 hr.

Physical properties:

Strength:
9,000-11,500 psi. tensile
9,500-14,500 psi. bending
20,000-25,000 psi. compression, but can be raised to 30,000-35,000 psi. by curing for a longer period
Mold Shrinkage—0.004 in. per inch
After shrinkage—0.000128 in. per in. during first year after curing

Bushing holes are drilled oversize and undercut; (2) The drill bushings are located by drill rod entering the holes in the component; (3) Finally Cerromatrix alloy is poured around the bushings, keying them in place by means of the undercuts provided. Cost savings realized by this procedure reach 50 percent.

Inspection fixtures are not produced so easily. A number of painstaking operations are required; the cost may be twice as much as for master mahogany models. Yet the advantages of dimensional stability, and freedom from warpage make the additional expense worthwhile. Army Air Forces inspection standards call for holding dimensions of assemblies, like the leading edge for a P-63 Kingcobra wing, to 0.008 in.; Bell Aircraft on the other hand wishes to hold its assembly fixtures to 0.003 in., so that any accumulation of errors in the product will not exceed A.A.F. requirements. It would be difficult to insure these requirements with wood inspection fixtures, without storing them under closely controlled temperature and humidity conditions.

Both the leading-edge assembly jigs and the cast plastic inspection fixtures are made to the same references—station templets at the extremities of the skin. Since the plastic fixtures, or plugs, are dimensionally stable, they can be relied upon for periodic inspection of the jigs for wrack or misalignment. The plastic plug is merely dropped into the jig, and the dummy main beam, or clamping device of the fixture, is placed in the closed position. Obviously the jig requires repair if the dummy main beam does not seat properly or if with feeler gages it is possible to discover gaps between the plastic fixture and the station members of the jig.

The leading-edge of the wing is 170.5 in. long but is made in four sections. Thus, plastic inspection fixtures are required to check jigs for these stations: 0 to 43 in., 43 to 84 in., 84 to 140 in., and 140 to 170.5 in.

More than a dozen steps are required to produce one of these plastic sections. The lofting department furnishes fish templets for the several stations to the plastic tool department. Here, the fish templets are enlarged to allow for $\frac{1}{8}$-in. shrinkage per ft. of the plastic during curing, plus 1/64 in. to give material for cleaning up when scraping the contours to final size.

A male plaster shell is produced by setting the two shrink templets vertically on a sandstone table at the proper stations, building a burlap and wire netting frame 2 in. below the templet outlines, and applying patternmaker's plaster. While still soft, the plaster is "splined"; that is, a straight edge is drawn over the cast while in contact with the templets. Sometimes, piano wire is strung between the templets to assist in producing the required contours. When the plaster is dry, the surface is sprayed with Tygon black rubber paint to act as a parting agent, and prevent absorption of moisture when the female cast is made. About 20 hr. are required to produce the male plaster for one section of a leading-edge inspection fixture, including two templets from "Galvaneal" standard templet stock.

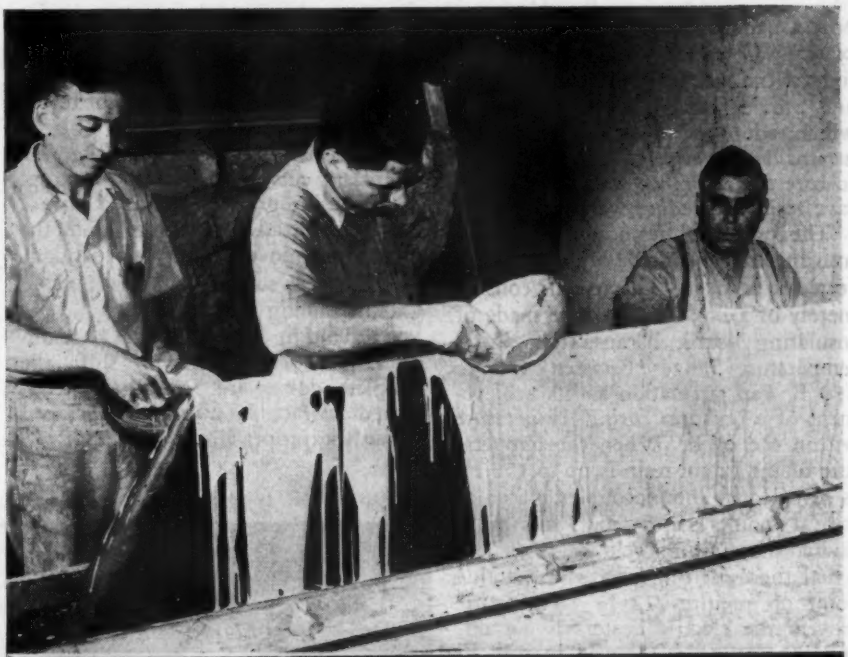
The next step is to make a reinforced female plaster shell, or mold, into which the Catavar is cast. A flash coat of plaster is applied to the male plaster shell, then matted sisal fiber dipped in plaster is applied until a 2-in. thickness is reached. Reinforcement is required because the female pattern is expected to hold a considerable weight of resin without distortion or cracking. Steel bars can be placed longitudinally about

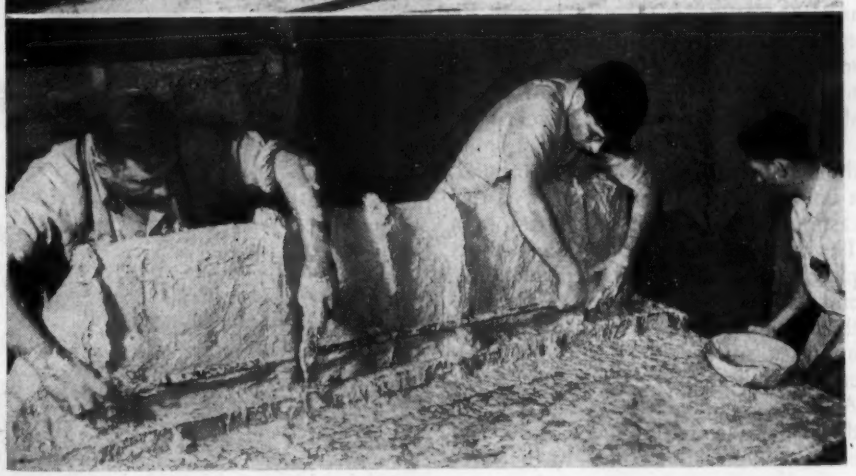
10 in. from the shell and connected to it by plaster legs (sisal fiber dipped in plaster) to avoid warpage from unequal expansion. These legs join the shell every 6 to 8 in.

Sometimes the ends of the female plaster shell are purposely left open. To prevent warpage, hook bolts and turnbuckles can be applied at the open ends and across the top of the shell until the plaster is thoroughly set. The male pattern is then removed, and the mold cavity is coated first with zinc chromate primer and then sprayed with white Tygon and finally with black Tygon paint to be sure of proper complete coverage.

Cracking of the plaster mold is avoided by drying in an oven for two to three days. The air within the oven is fan-circulated and maintained at a selected temperature between 100 to 150 F. Approximately 12 hr. before the end of the drying cycle, drums of Catavar are placed in the oven, to reduce the time required to set after being poured into the mold. Heating for this period and to the temperature involved causes the liquid to become a heavy syrup.

When the mold is taken from the oven, the cavity is given two coats of Johnson's Glo-Coat wax for a parting agent and to promote a fine finish on the cast resin. The end plates (made separately) are then applied to the mold with a ¼ in. spacer between. The spacers provide a machining allowance on the ends of the cast resin plug. To avoid excessive machining at these locations, the end plates have bosses that indent the casting so that





Above—Tygon black rubber paint is sprayed on the male pattern, then a splash coating of plaster is applied when beginning the female plaster shell, or mold, for the plastic. Below—Wall thickness of the female shell is built up to approximately 2-in. thickness with sisal fiber dipped in plaster. Vertical plaster ribs are added for stiffness; the reinforcing bar prevents warpage as the mold dries

•

Liquid resin (Catavar of the non-accelerated type) is preheated to a heavy syrup consistency, then poured into the mold. Cores conserve plastic, but more importantly they create uniform wall thicknesses to avoid warpage while curing

only a band about 3 in. wide need be planed. Cores are also often used to lighten the weight of the resin casting and provide uniform wall thicknesses which reduce the possibility of internal strains and warpage. It is advisable to core for a 4½-in. wall thickness to save resin and reduce warpage.

The preheated resin is now poured into the mold, and the whole is transferred to an oven. This usually consists merely of a box-like structure made of insulating board, because the curing temperature ranges between 150 to 180 F. Fan circulation assists achievement of a uniform curing temperature within the oven. When the temperature of the liquid resin is up to 150 F., as revealed by thermocouples placed at critical points throughout the mold cavity, the timing cycle begins. The actual thermosetting process from this point on requires 72 hr. Then current to the electric heaters is cut off, and the casting is allowed to cool to room temperature while in the oven. If removed before reaching this temperature, the casting is likely to warp slightly when struck by air currents.

When the mold is withdrawn from the oven, the cores are pulled out, and a hole is drilled through a web of the casting for attachment of a lifting eye. The casting is next set-up on a surface plate and the baseline is scribed. One end of the casting is planed square with the baseline. Then the casting is set-up on a surface plate and the other end is indicated with a height gage. After the second end is planed to final dimension, station templets are fastened to the machined ends of the casting. The contour of the plastic plug is scraped to a 100 percent bearing, using a straight edge held against the station templets to transfer color to the high spots. Power hacksaw blades make excellent scraping tools, because the plastic cuts much like wood, except that it has no grain. The glazed surface on the material as it comes from the mold is removed with belt sanders. The scraped surface is buffed, using Catalin buffing compound.

By avoiding machining the base until last, it is possible to shift the templets downward in case the contoured surface is injured or scraped below the proper level.

After two sections are scraped to their station templets, they are put together on dowels and checked with a straight edge.

Inspection fixtures for the leading edge are used nose down. The Plastic Tool Department made wood cradles for storing them in this position, to avoid the chances of warpage.

Plastic inspection fixtures for leading-edge assembly jigs were among the first complex shapes produced by the Plastic Tool Department. Since then a number of other inspection devices have been made, notably a large cone-like structure, which is a replica of a lofted Airacobra nose assembly.

Chord lines are scribed on the plastic inspection fixtures for the leading-edge assembly jig. Metal station templets are fastened to each end of the casting to control scraping

Belt sanders remove the glaze-like surface of the cast plastic, then workers scrape the surface to contour, or until a straight edge contacts the station templets at the ends of the piece. The straight edge is coated with prussian blue to detect high spots on the plastic master

Fixture Spaces Keyways Accurately

BY CARL G. PREIS, VICE PRESIDENT AND GENERAL MANAGER,
AMERTORP CORPORATION, DIVISION OF AMERICAN CAN COMPANY

Canco tool engineers developed a device for milling keyways on torpedo propeller shafts to close tolerances, 90-deg. apart

TWO PROPELLER SHAFTS, one running inside of the other, drive each of the torpedoes manufactured for the U. S. Navy at the Naval Ordnance Plant operated by the Amertorp Corporation, a division of the American Can Company. Four ¼-in. wide keyways must be milled in each end of each of these shafts. These keyways must be on center within 0.002 in. and the keyways on opposite ends of each shaft must align within the same tolerance limit. In addition, the four keyways at each end must be spaced 90 deg. apart around the periphery of the shaft within plus or minus 0.002 in. The width of the keyway must be held within 0.0005 in. while the depth has a tolerance of 0.001 in.

In order to finish propeller shaft keyways to these tolerances, Canco tool engineers have developed the fixture shown in the accompanying illustrations. A different fixture is required for each shaft length, but a given fixture can be used for shafts of different diameters.

The fixture is mounted on a standard Taylor & Fenn two-spindle spline miller in such a way that the fixture moves with the machine table as the work is traversed past the cutters. After a pair of opposite keyways has been milled in one end of the shaft, the shaft is turned 90 deg. until one of the keyways matches with an adjustable gage plate in the forward end of the fixture. After all shafts of one lot have been keywayed on one end, the fixture is set-up for milling the keyways in the other end of these shafts. Gage plates are mounted on the support bars at the rear end of the fixture for the second operation. When the keyways at the end of the shaft have been positioned over these gage plates, the keyways in the other end of the shaft will be in accurate alignment.

The fixture is supported on a frame attached to the base of the miller. The fixture itself is bolted to the table of the machine and is moved with it, supporting the shaft on male centers and locating it for length with a V-block gage fitting against a shoulder on the shaft. The accuracy of this fixture is such that an inexperienced operator can be trained to the work efficiently in a short space of time.

Gage plates at the rear end of the fixture fit into previously milled keyways so that the keyways being milled at the other end will be in line

Metal-Working Executives Expect Prolonged Postwar Boom

A carefully checked survey of 329 representative metal-working companies reveals a generally favorable postwar outlook with some surprising implications for American industry as a whole

AMERICAN METAL-WORKING companies anticipate a 55 percent rise in postwar sales volume over prewar levels, and expect to hire 36 percent more workers after the war than they did in 1939, according to a representative cross-section of opinion gathered by this publication in a special postwar survey. Moreover, more than half of the firms with specific reconversion plans expect to be able to reconvert almost immediately, while an additional 33 1/3 percent will require up to three months to reconvert. Practically all the balance estimated required reconversion time up to six months.

This favorable postwar outlook was the result of a careful study of the position of 329 representative metal-working plants selected by type of business and geographical location. These results represent the expression of opinion of top executives interviewed personally in 166 cases, with the other 163 plants being covered by mail.

Of 221 firms estimating their postwar sales volume, the average expectation was a 55 percent improvement over prewar levels. Since 1939 sales for all metal-working companies totaled $19,224,882,695, postwar expectancy for the entire industry on a 55 percent rise basis would raise sales to $29,798,568,177.

Five-Year Outlook Good

A more amazing aspect of this outlook is that the consensus of opinion leaned to five years of good business after the war. To secure this expected volume, many firms plan to add new products to their line, while a few may reduce diversification to concentrate their output on their more profitable items. Many firms say that they have several years' backlog of postwar business on hand, while others report they have been promised about five years of good business from the automobile industry and other groups.

With respect to manpower, 267 firms expect to employ 248,971 workers after the war, or 932 per plant. This will be a 36 percent gain over the prewar average of 685 per plant, although it means a 29 percent layoff of present workers averaging, 1,310 per plant. However, this is a less severe drop from high wartime levels than many people expected in view of the need of eliminating extra shifts.

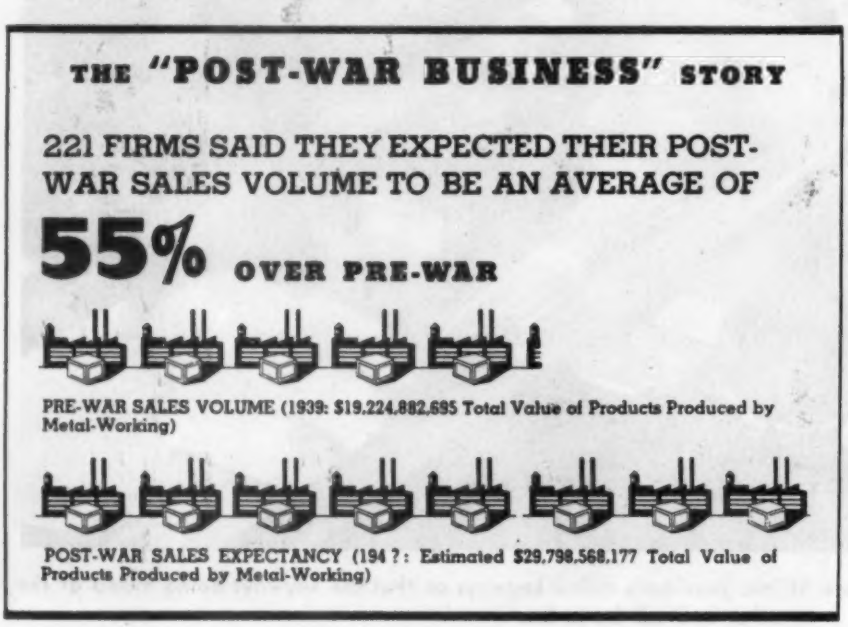
A few firms normally producing consumers' goods fear wage trouble after the war. One manufacturer stated. "The girls to whom we paid $20 to $30 a week before the war now get $70 to $80. They will not go back to prewar wages. But even if we increased the prices of our products by 50 percent to 100 percent, we could not pay these wages."

Equipment Purchases Planned

Despite the all-time record-breaking sales of machine tools during the past few war years, many firms will still be in the market after the war to replace hard-driven equipment and units badly handled by green help. About two-thirds of the firms surveyed plan to buy—218 companies expect to purchase $36,472,758 worth of machine tools, or $167,306 per plant. Of the total, roughly a third or $12,299,408 worth ($56,419 per plant) will be secured from government-owned surpluses. Omitted from this total was one large firm planning to buy $12,500,000 worth of machine tools, of which $10,000,000 will consist of items purchased from Defense Plant Corporation. This figure would have distorted the over-all picture if included with the other purchase programs.

Firms planning to buy DPC equipment will select items carefully. They point out that some DPC items in their plants have been abused by inexperienced operators. Another typical view was: "We have had some experience with used tools bought by DPC and turned over to us. We had to do so much repair work that it almost equalled the cost of new machines without getting similar production. We shall keep this in mind when we consider buying used tools." Other executives plan to buy carefully, saying, "We have no reluctance to buy government-owned tools provided we have a thorough inspection made."

The competitive factor was greatly


THE "POST-WAR BUSINESS" STORY
221 FIRMS SAID THEY EXPECTED THEIR POST-WAR SALES VOLUME TO BE AN AVERAGE OF
55% OVER PRE-WAR
PRE-WAR SALES VOLUME (1939: $19,224,882,695 Total Value of Products Produced by Metal-Working)
POST-WAR SALES EXPECTANCY (194?: Estimated $29,798,568,177 Total Value of Products Produced by Metal-Working)

in evidence in plans for buying new equipment. For example, one company officer said, "If the machine tool people come along with the new developments they are talking about, we'll have to replace some of our tools to meet competition," while another official stated: "Our equipment has taken a terrible beating on three-shift operation and to meet competition we will need new equipment."

Improved manufacturing methods gained from wartime experience, plans for new postwar products, expansion programs and plant rearrangement to increase operating efficiency provided other motives for buying more equipment after the war. Although some concerns did not specify the types of equipment they plan to purchase, others mentioned almost every type of machine tool plus other equipment such as heat-treating, forging, materials handling, and finishing units.

Types of Machines Needed

Of those firms specifying planned equipment purchases after the war, 65 firms will buy lathes of various types, 32 mentioned millers, 30 will seek grinders, 42 require presses and brakes, and 17 need screw machines. Other items were less frequently mentioned among buying programs. It should be emphasized that these enumerations do not indicate numbers of units to be purchased, but rather the number of buyers.

The over-all situation of present equipment may be determined from the fact that 198 firms reported that $349,919,213 worth of equipment, averaging $1,767,269 per plant, is now installed in their plants, of which about one-third is government-owned. Plant-owned equipment amounts to $264,959,925, or $1,338,181 per plant, which is only a moderate increase from prewar installations totalling $244,518,591, or $1,234,892 per plant. However, the small increase in private purchases indicated by these figures is partly due to the fact that replacements of obsolete tools are not reflected in these statistics.

In order to maintain prewar plant efficiency, it would have been necessary for these plants to replace about a third of their 1939 equipment by 1944. This would have amounted to about $80,000,000 worth of the present privately owned equipment, plus the obvious increase of almost $20,000,000 in private plant investment. The resultant total, or about $100,000,000 compares favorably with the $135,000,000 worth of government-owned equipment installed in these plants.

Since the AMERICAN MACHINIST's 1940 survey of metal-working equipment indicated that 70 percent of the units being operated were over 10 years old, the considerable room for improvement in plant equipment during the past five years is obvious. The many new machines which have been installed, either privately owned or government owned, since 1939 have greatly reduced the average age of equipment in American metal-working plants. However, this relatively young equipment has been hard-pressed by round-the-clock operation and by abuse from inexperienced help. These factors have also tended to speed up depreciation of older equipment. Thus, many units both old and relatively new will have to come out of industry's postwar production lines, and be replaced by newer equipment.

This general situation is indicated by reports, such as: "We have kept all our tools in good shape, but because of the amount of work done, they are really five or six years old when you have had them only two or three years." The government figures the life of an average machine tool is 16 years but we feel this is not right especially now, when machines are kept running in many cases over 120 hours per week."

Many Tools in Bad Shape

Over-all, of 100 firms appraising the condition of their machine tools, only 10 regarded them as excellent, 48 called them in "good" condition, 30 said "fair," while 12 frankly admitted they were in "poor" state. This indicates that 42 out of these 100 firms were not entirely satisfied with the condition of their machine tools.

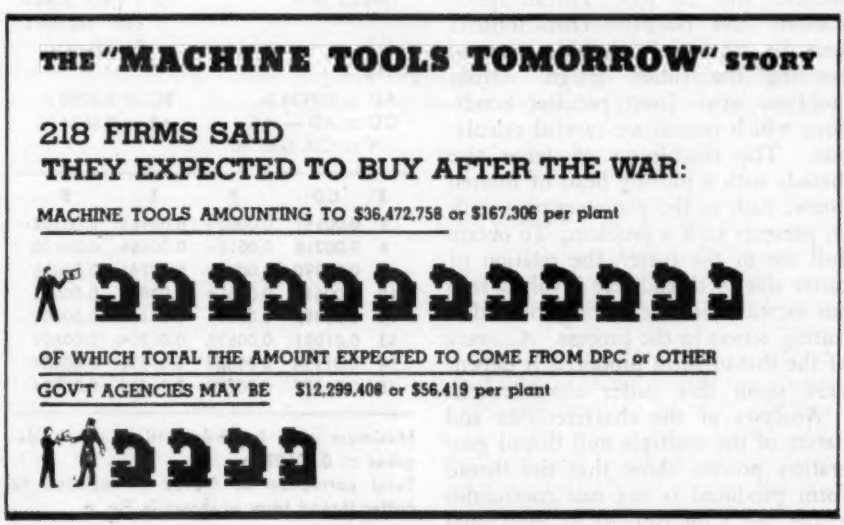
Although most plants surveyed expect to be able to reconvert to civilian production fairly promptly, many of them qualified such expectation on the provision that certain problems were solved. Major uncertainty was contract settlement and plant clearance, with postwar prices and wages representing a secondary problem. A manufacturer of a prewar $1 item stated, "We can't produce the product to retail at this price if you have to pay labor $1.20 instead of the 68 cents they formerly made." A company manufacturing household products plans to install certain labor-saving equipment in order to offset wage increases.

Meanwhile, concerns which will have the most reconversion trouble will be those which had to rearrange their plants completely to enter war production. They will require the longest time to reconvert, while other firms holding war contracts that will not be cut at the end of the European War will probably be "far behind everyone else" in going back to their regular business.

Foreign Trade Sought

Companies which normally did a good foreign business expect to do better in the foreign market than ever before. Others planned to enter the export market, even though they had done very little exporting before the war. Russia and Latin-America were most frequently mentioned as prospectively bright foreign markets, with the reconstruction of Europe also referred to as requiring American equipment and tools. Aircraft engines and parts business abroad is expected to be more than double prewar levels.

A study of all statements made on the various aspects of postwar prospects indicates a general feeling of confidence and an aggressive attitude toward the future. The most frequently expressed concern was possible lack of government cooperation on contract terminations, prices, wages, plant clearance, sales of surplus tools and depreciation policies.


THE "MACHINE TOOLS TOMORROW" STORY
218 FIRMS SAID
THEY EXPECTED TO BUY AFTER THE WAR:
MACHINE TOOLS AMOUNTING TO $36,472,758 or $167,306 per plant
OF WHICH TOTAL THE AMOUNT EXPECTED TO COME FROM DPC or OTHER
GOV'T AGENCIES MAY BE $12,299,408 or $56,419 per plant

Thread Errors Can Be Overcome Through Slight Cutter Design Changes

BY ROGER W. BOLZ, NATIONAL CARBON COMPANY

Undercutting by a thread mill can be prevented by correcting the tooth form in accordance with calculations to learn the amounts and position of error

THE MULTIPLE THREAD MILL might be described as a form relieved cutter with uniform cam relief on each cutting tooth. These rows of teeth form a series of convolutions about the periphery normal to the rotational axis of the cutter. The so-called teeth are situated around the cutter in a true circular pattern, and unlike the gear cutting hob, have no pitch or longitudinal lead. Gashes or lands between cutting teeth may be either straight or helical, as required by characteristics of the material to be milled. The cutting edge of each tooth may be either radial or raked positively or negatively as specified by usage.

A multiple thread milling cutter is usually designed specifically to suit the machine and the job. Thread specifications and machine characteristics must be taken into consideration in evolving the cutter design. Often problems arise from peculiar conditions which necessitate careful calculation. The machining of large size threads with a milling head of limited throw, such as the planetary-type miller, presents such a problem. To obtain full use of the cutter, the relation of cutter size to thread size involves serious increases in side cutting, or undercutting action in the process. Accuracy of the thread form produced is dependent upon this cutter characteristic.

Analyses of the characteristics and nature of the multiple mill thread generation process show that the thread form produced is not one continuous curve, but a multiplicity of individual cuts. The properly designed cutter places these multiple cuts closely along the theoretical thread contour. Thus, cutter diameter, number of teeth, and cutter speed and feed combine to produce the series of cuts so closely spaced as to preclude any inaccuracies.

The generation of a thread by this method might well be called a mathematical process. The design details of the cutter, cutter settings, and the various movements of the milling machine must be in a definite mathematical relationship.

In this mathematical process, it can be seen that the relationship between the cutter diameter and the theoretical thread diameter, likewise between the cutter tooth form and the theoretical thread form, is critical. In the process of generating the thread helix with the cutter's circular formed teeth, these relationships must be calculated and corrected to produce the theoretical thread form intended. Otherwise, the path followed by cutter teeth in the work may prove to be a thread form which is distinctly wider than the cutter tooth itself. This action of the cutter, known as undercutting or side cutting, increases considerably as the diameter of the cutter approaches the minor diameter of a female thread or exceeds considerably the major diameter of a male thread.

In order to nullify this tendency toward thread form error by the side cutting action in the mill, it is necessary to correct the cutter tooth form accordingly. By proper calculation of the error produced by the work and cutter combination, and correction of the cutter tooth form, true theoretical tooth form can be generated to close limits.

To determine the amounts and position of maximum error produced, cutter rise must be calculated at a number of varying positions. Figs. 2, 3, and 4 illustrate the general cutter relationships involved. In determining the undercutting characteristics, several widely varying angles X should be assumed and interference, if any, calculated. A full sized layout will determine most easily the maximum possible angle of cutter sweep within the thread. Detailed calculations at the range of greatest error will locate the angle X at which the maximum amount of interference is found. Dimension AC can be calculated at any angle X at which the maximum amount of interference is found. Dimension AC can be calculated at any angle X since AB, BC, AD, and the angle X are known. Then, $AD - AC = CD$ in Fig. 2, and $AC - AD = CD$ in Fig. 4. Thus, cutter rise CD can be found for any angle X within the sweep of the cutter tip in the thread. This value of CD and the thread form angle combine to determine the actual allowable cutter lead Y, Fig. 3. Considering an American National standard thread as shown in

CALCULATIONS I

Specifications:

Cutter diameter	= 7.2500 in.
Major diameter of thread	= 7.9848 in.
Thread form	= 3 Pitch American National Standard

In Fig. 2.

$AD = 3.9924$ in. $\quad BC = 3.6250$ in.

$CD = AD - AC \quad AB = 0.3674$ in.

$Y = CD \tan 30$

X	CD	Y	L	E
5	0.00141	0.00081	0.00463	0.00382
6	0.00218	0.00126	0.00556	0.00430
8	0.00390	0.00225	0.00741	0.00516
10	0.00613	0.00354	0.00925	0.00571
12	0.00885	0.00511	0.01111	0.00600
13	0.01031	0.00595	0.01204	0.00609
14	0.01194	0.00689	0.01296	0.00607
15	0.01377	0.00795	0.01389	0.00594

Maximum error in undercutting at 13 degrees = 0.00609 in.

Total correction of 0.0122 in. applied to cutter thread form as shown in Fig. 6.

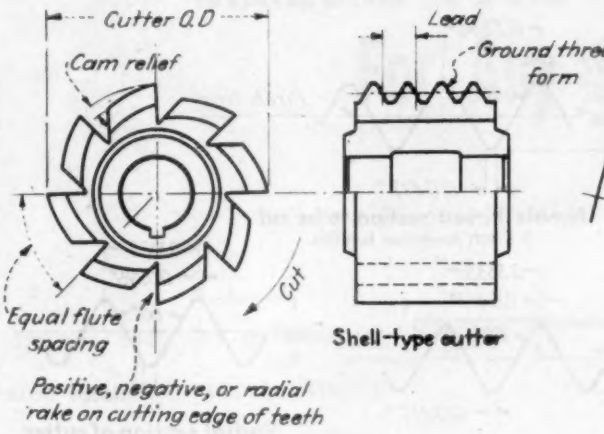


FIG. 1

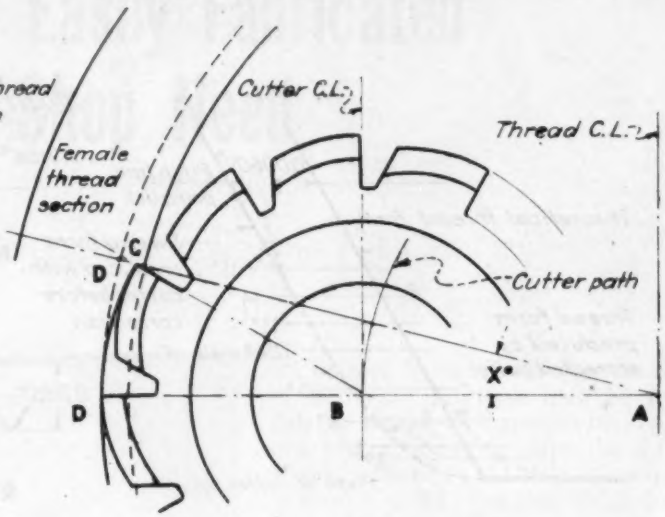


FIG. 2

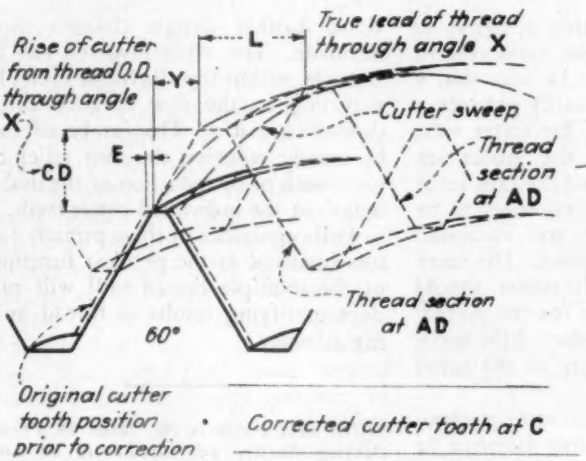


FIG. 3

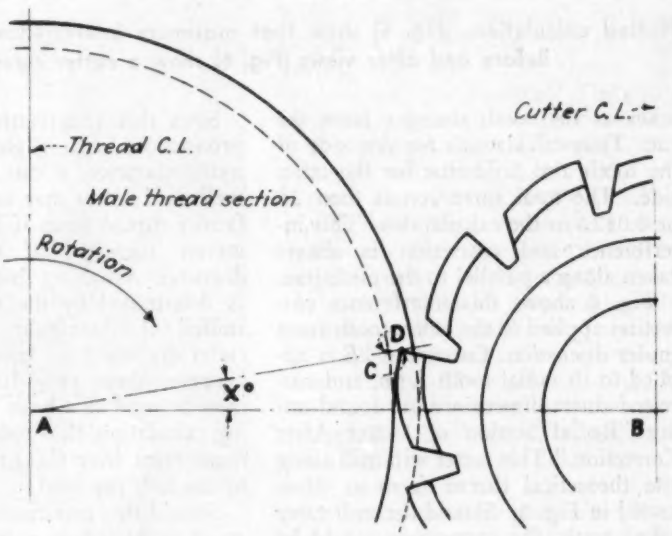


FIG. 4

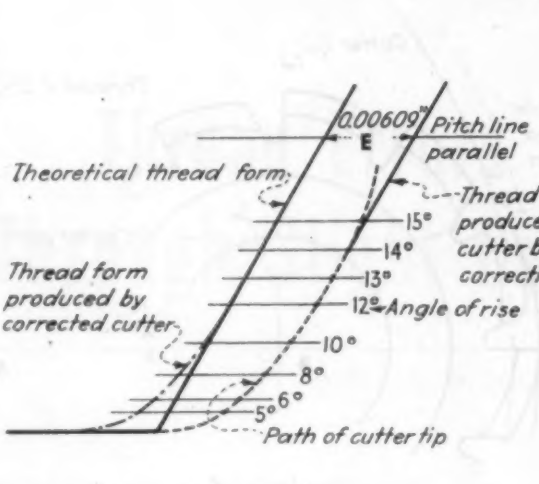
General detail of a multiple thread form milling cutter of the type discussed is shown in Fig. 1. Relationship between cutter and thread (Fig. 2) is determined through major thread radius *AD*, major cutter radius *BC* and rise of cutter tooth *CD* through angle *X*. Should lead travel *L* of the cutter (Fig. 3) prove to be greater than the allowable thread *Y*, the difference *E* is interference. Relationship between cutter and thread details in milling a male thread is shown in Fig. 4

Fig. 3, $CD \tan. 30 = Y$, and 0.57735 CD is the actual allowable cutter lead Y through angular rise X in each case. This allowable lead of the cutter can now be checked against the true or theoretical lead advance L of the cutter in producing the correct thread form. L is the product of the thread lead and the ratio of angle X to the total angular sweep, or 360 deg.

Should the lead travel L of the cutter, Fig. 3, prove to be greater than the actual allowable travel Y, the difference E is interference. Typical calculaitons follow:

Calculations I illustrate conditions of interference in a female thread, and show that it is only under extreme conditions in milling male threads that interference is actually present. Thus female threads made with a large cutter to thread size ratio must be carefully calculated and corrected. The path of the cutter tip (Fig. 2) in undercutting is illustrated by the calculations plotted in Fig. 5. With the cutter and thread in question, maximum interference is found at 13 deg. and amounts to 0.00609 in. Beginning at the point of maximum error, the sweep of the cutter tip produces a smooth blended curve to the root of the thread.

This undercutting action is also true of the other side of the cutter tooth. One side will undercut as the tooth moves to full thread depth and the



Path of tooth in undercutting

FIG. 5

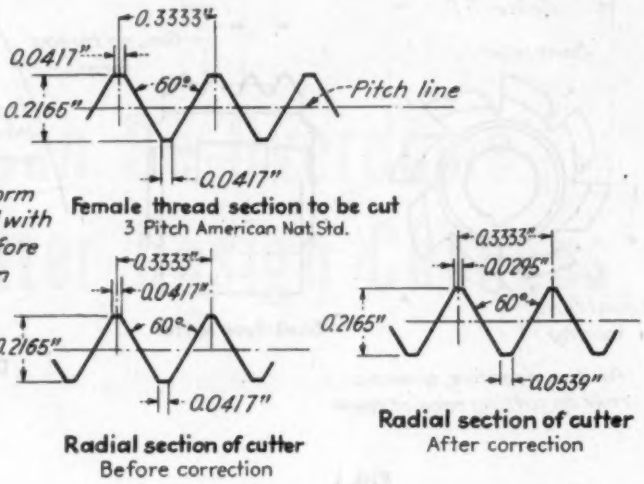


FIG. 6

Plotted calculations (Fig. 5) show that maximum interference will be found at 13 deg. and amounts to 0.00609 in. Before and after views (Fig. 6) show a cutter corrected to produce the tooth form desired

other as the tooth emerges from the cut. Thus calculations for one side of the tooth also hold true for the other side. The total correction is then $2E$ or 0.0122 in the calculations. This interference and correction is always taken along a parallel to the pitch line.

Fig. 6 shows this interference correction applied to the cutter tooth form under discussion. Correction $2E$ is applied to th radial tooth form, and corrected cutter dimensions are found under "Radial Section of Cutter After Correction." This cutter will mill along the theoretical thread form as illustrated in Fig. 5. Should the mill carry raked teeth, the corrections would be the same, tooth depth and included angle being the only dimensions which would vary.

Since this undercutting action is so pronounced with slight variations in cutter diameter, it can be seen that a well used cutter may easily produce a faculty thread form if the cutter were merely corrected at the maximum diameter. Assuming that the cam relief is determined by the materials to be milled, the maximum and minimum cutter diameters are known. The mean between these two diameters should then be used as a basis for the preceding calculation, thus reducing the maximum error over the life of the cutter to one half the total.

Should this maximum error at maximum or minimum cutter diameter be in excess of the allowable variations, further design changes must be made. The error involved can be brought within the allowable limits by reduction in the new to used cutter diameter variation. This can be affected by merely reducing the cam relief on each tooth or by reduction of the usable length of the individual cutter teeth.

Full cognizance of these primary factors involved in the peculiar functions of the multiple thread mill will produce gratifying results in thread milling accuracy.

The next article in this series on Thread Milling Cutters will appear in an early number.

CALCULATIONS II

Specifications:

Cutter diameter	= 3.000 in.
Major diameter of thread	= 4.000 in.
Thread form	= 4 Pitch American National Standard

In Fig. 4.

AD = 1.8376 in.	BC = 1.5000 in.
CD = AC — AD	AB = 3.3376 in.
Y = CD tan. 30	

X	CD	Y	L	E
5	0.0157 in.	0.00906 in.	0.00347 in.	*none*
10	0.0657 in.	0.03793 in.	0.00694 in.	*none*

No amount of undercutting apparent even at a small angle such as 5 deg.
No correction necessary

Magnesium's Future

SINCE the 300,000-ton capacity in the United States was far in excess of military requirements, magnesium was entirely freed of government controls on October 3, 1944, thus giving this lightest of the major metals first crack at reconversion. But its capacity is small in relation to other metals—less than one third of one percent of total steel capacity.

Because of magnesium's lightness (it is one quarter the weight of steel), Dr. William H. Dow, president, Dow Chemical Company, major producer, believes it is the "natural and inevitable material for anything that has to be moved." But it may take a lot of pioneering before the metal is widely used in transportation.

Right now apparent postwar markets would only call for 9,000 tons of magnesium, although the industry plans to promote many immediate uses in consumers products, such as perabulators and wheelbarrows. A magnesium wheelbarrow weighs 30 pounds, as against 85 pounds for an ordinary barrow. Over the longer term, if auto makers ever use magnesium in three fourths of their wheels, that use alone would engage the bulk of the industry's present capacity.

Diamond Tools Easily Fabricated For Any Shop Need

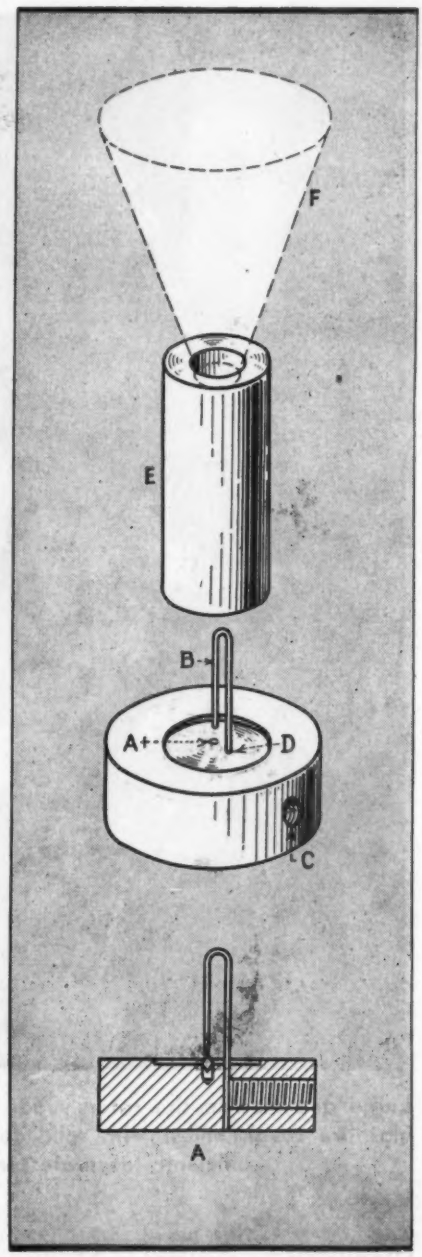
BY E. J. SUMMERILL, HALLIBURTON OIL WELL CEMENTING COMPANY

Diamonds used for dressing or truing grinding wheels usually are mounted in their natural form, but can be sharpened to a point or chisel edge depending upon the type of duty required

DEPENDABLE DIAMOND TOOLS for truing or dressing grinding wheels can be made up in the average shop by the use of simple molds and Kirksite A, in which the diamonds are mounted. This material has proved to be satisfactory in forming diamond tools for a number of reasons. The low pouring point, from 825 to 850 F., eliminates the possibility of damaging the diamond because of excessive heat. The shrinkage characteristic of the material on cooling assures solid clamping and backing on all faces of the diamond.

The details of a simple, straight-shank tool are shown in the illustration. Tools with fins, heads, tapered shanks and other special features can be made easily with molds as simple as the one shown, which shows the method for supporting the diamond during casting procedure. The conventional method of bending the supporting wire to encompass the diamond, touching it at several points, has been eliminated. This looped wire caused air-bubble formations near the diamond and if any bubbles are present they eliminate the solid backing which is definitely necessary for a normal tool life. Diamonds which are not properly backed in a holder cannot withstand the constant chattering effect set up when they are used to true up grinding wheels.

The length of the wire loop, *B*, is considerably greater than the width of the U-shaped formation. This wire is usually spring brass, or half hard brass wire. It should be free of burrs and brought to a fine point where it touches the diamond being mounted. The cutting point of the diamond is placed in the hole, *A*, located in the exact center of the base. This hole must be accurately located, as it governs the concentricity of the tool. After the diamond is placed in the hole, the wire is inserted in the offset hole, *D*, in the base. The point of the wire is then placed against the diamond and the set screw, *C*, tightened securely. This holds the diamond in the proper position during the casting procedure. After locating the diamond in the base, the mold, *E*, is placed over the supporting wire and seated snugly into the base over the diamond. The entire assembly is then heated to about 650 F.



A soft alloy with a low pouring point and with high shrinkage characteristics is used for mounting diamonds in tools for truing abrasive wheels, which insures solid clamping on all sides of the diamond

A standpipe, *F*, of sheet metal, or a piece turned from solid metal, is slipped into the top of the mold to supply head pressure for the casting operation. This standpipe should be approximately 5 in. long for the average tool. The head pressure is sufficient to produce good backing and will fill the mold securely for any average diamond tool. The material, at 825 to 850 F., is then poured into the mold through the standpipe. The standpipe should not be removed until the material has cooled and is almost hard, after which the standpipe may be removed, the diamond tool taken from the mold and the supporting wire pulled free of the base. The brass wire should be clipped off at the face of the tool and dressed on a grinding wheel, if necessary.

A great advantage gained by the shop fabricating diamond tools is that unmounted diamonds may be purchased in quantity and sizes to suit the machines in use, which allows a thorough examination of potential cutting points and possible defects. When renewal of a diamond becomes necessary the entire shank may be melted and the diamond reclaimed, after which they should be weighed and graded for use in smaller tools. In this way it is possible to use diamonds of the largest sizes required until their useful life in regular operations has been exhausted, when they can be used in small nib tools for freehand dressing purposes.

Fly Cutters Used to Form-Mill Contours on Compressor Rotors

BY MILTON HOEPPNER, MASTER MECHANIC, B-W SUPERCHARGERS, INC.

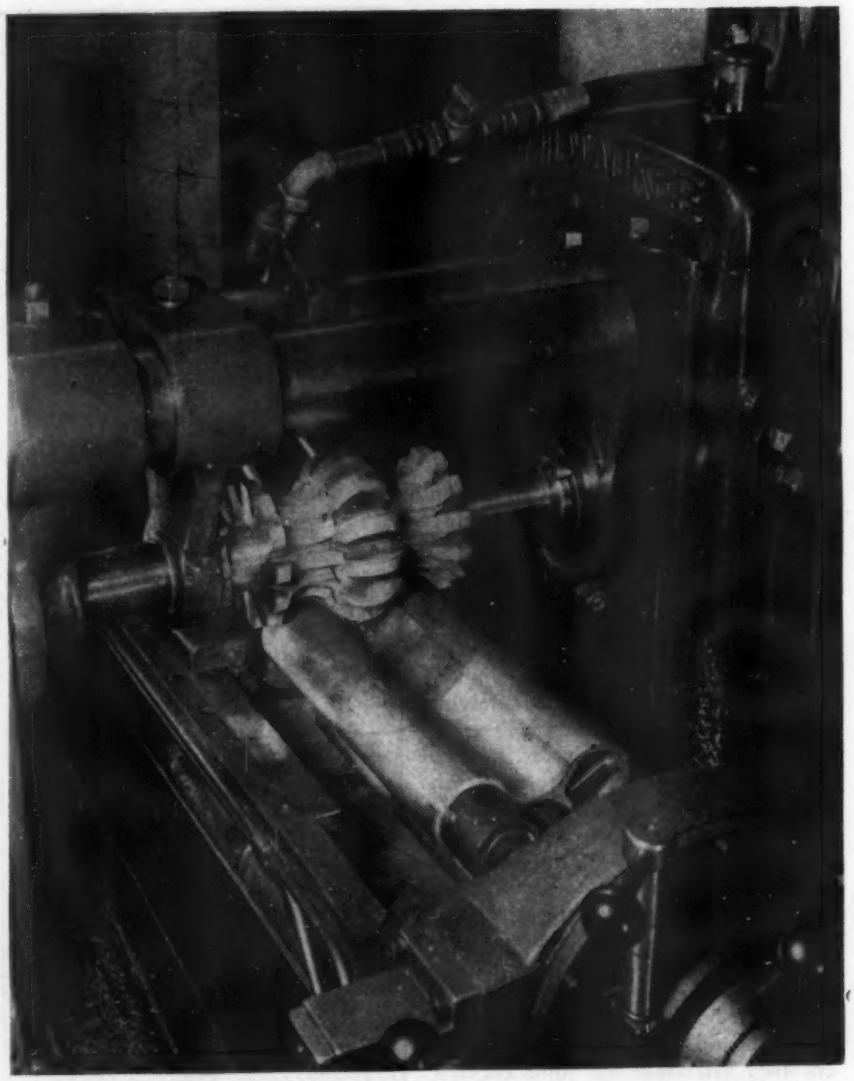
Special cutters which replace the usual form-milling tools are made by inserting steel bits in the cutter body, which is made integral with its arbor

FOR MAXIMUM operating efficiency in completed units, machining tolerances are small on most parts of the positive-displacement blowers, air compressors and superchargers manufactured by B-W Superchargers, Inc., Division of Borg-Warner Corporation. This is particularly true of the three-lobe rotors, two of which are used in each compressor. These two rotors mesh together in the same manner as three-tooth gears when they are assembled in the housing of the compressor.

Because of high rotating speeds, these rotating elements must not touch or drag on each other. At the same time, any increase in the amount of clearance between the surfaces of the two rotors, above the minimum clearance necessary to insure against contact, leads to a reduction in efficiency. Therefore, the lobe surfaces on each rotor must be accurate within 0.0002 to 0.0003 in. for contour and within about 0.002 in. for location.

Rotors for the compressors made by B-W Superchargers range from 3 to 24 in. long and up to about 12 in. diameter. All rotors are made from aluminum alloy, smaller ones die-cast to close limits, and larger rotors cast in permanent molds. Small die-cast rotors are so close to size when delivered to the machine shop that the lobe contours need be machined only on a relatively small portion of their total contour. On the other hand, it is necessary to machine the entire contour of the lobes of the rotors cast in permanent molds.

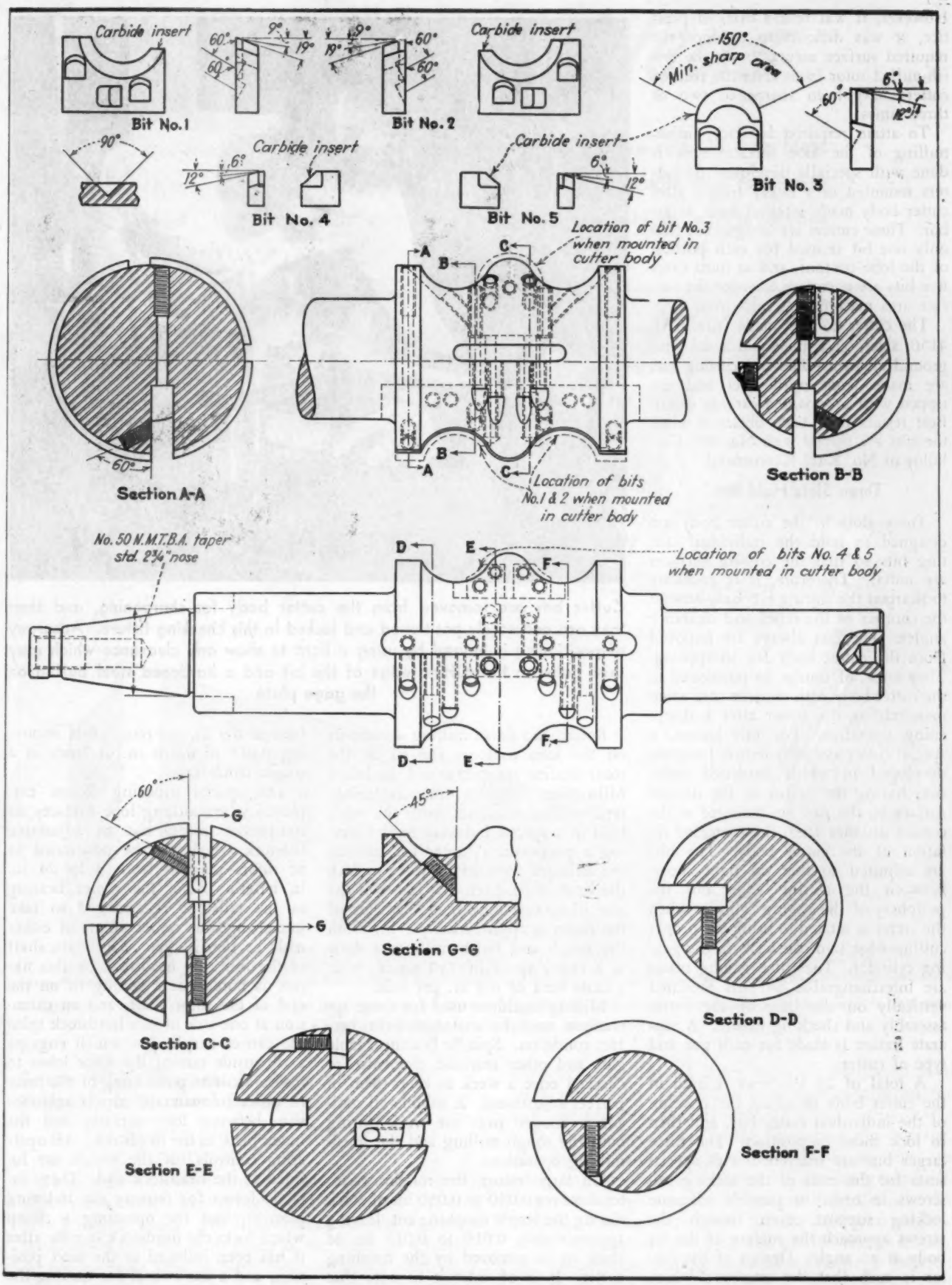
After rotor bodies have been finish bored and broached, they are pressed onto the proper steel shafts and the ends are finish faced and grooved.



Large and medium-size rotors made from aluminum permanent-mold castings are rough milled with solid formed cutters. These cutters are not sufficiently accurate for the finishing operations

Next, rotors are delivered to a milling machine for rough and finish milling lobe contours. In the case of die-cast rotors, only a single finish-milling cut is necessary on the lobe surfaces. For the larger rotors, however, two milling cuts are necessary.

Originally, rough and finish milling operations on large rotors used formed milling cutters with eccentric relief back of the cutting edges. For the smaller permanent-mold cast rotors, solid cutters with helically gashed teeth were used while section cutters were used for large rotors. Such cutters still are used for the roughing cuts.



Three slots are milled in the cutter body to position the five carbide-tipped bits used for finish milling lobe surfaces on compressor rotors. Positioning and locking set screws are provided for each bit. This type fly cutter is used to mill all medium and large sizes of compressor rotors

However, it was found that, in practice, it was difficult to produce the required surface accuracies on the finish-milled rotor lobes after the formed cutters have been sharpened two or three times.

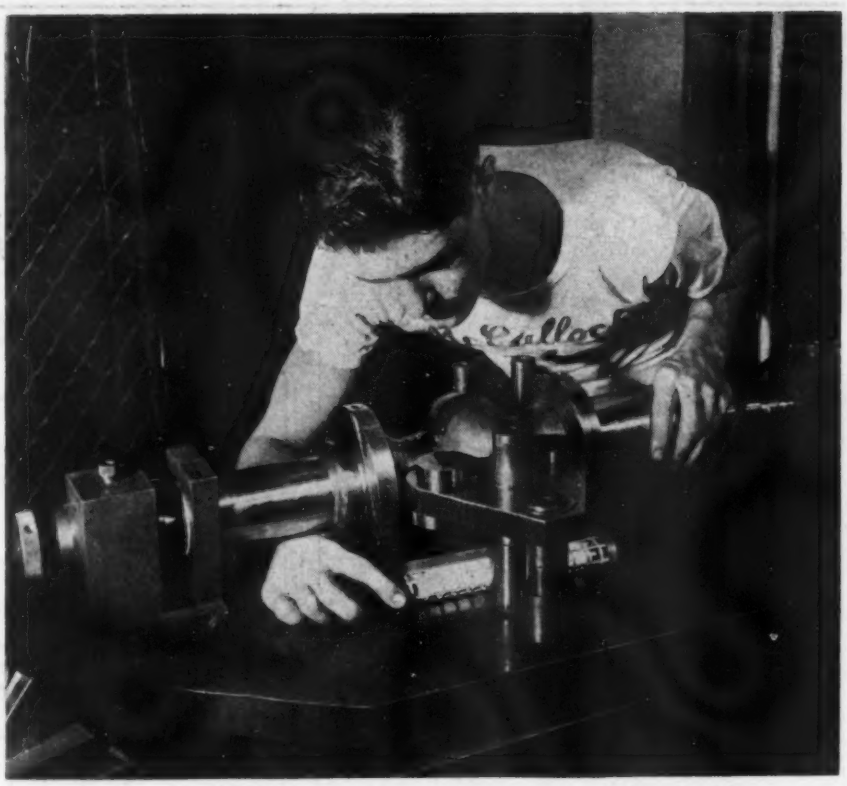
To attain required accuracy, finish-milling of the lobe surfaces now is done with specially developed fly cutters mounted in a heavy forged steel cutter body made integral with its arbor. These cutters are designed so that only one bit is used for each portion of the lobe contour, and in most cases five bits are necessary to cover the surface area machined at each pass.

The cutter body is made from SAE 4150 steel, and it is hardened and ground all over. The five cutting bits are made from mild steel and are tipped with a cemented carbide insert. Best results have been obtained when the bits are tipped with No. 883 Carboloy or No. K4H Kennametal.

Three Slots Hold Bits

Three slots in the cutter body are designed to hold the individual cutting bits so that the cutting surfaces are radial. Therefore, it is necessary to sharpen the cutting bits only around the contour of the relief and clearance angles. The bits always are removed from the cutter body for sharpening. They must, of course, be positioned in the cutter body with extreme care when reassembling the cutter after a sharpening operation. For this reason, a special cutter assembly fixture has been developed in which hardened cylinders having the radius of the desired surface on the part are mounted at the correct distance from the center of rotation of the cutter body. The bits are adjusted so that no light shows between the cutting edge and the periphery of the gaging cylinder when the cutter is rotated to bring the proper cutting edge into contact with the gaging cylinder. The three gaging plates are interchangeable on pins mounted vertically on the base of the cutter assembly and checking fixture. A separate fixture is made for each size and type of cutter.

A total of 23 setscrews is used in the cutter body to adjust the position of the individual cutter bits, and then to lock them in position. The three larger bits are machined with special seats for the ends of the rocking setscrews in order to provide adequate locking support, even though the screws approach the surface of the bit body at an angle. Design of the cutter is such that the setscrews which lock the two smaller bits in place are at right angles to the top surface of the bit body, so this arrangement is not necessary in their case.



Cutter bits are removed from the cutter body for sharpening, and then they are accurately positioned and locked in this checking fixture. Accuracy of positioning is insured by using a light to show any clearance which may exist between the cutting edge of the bit and a hardened steel button on the gage plate

Rough and finish milling operations on the lobe contours for all of the rotor bodies are performed in heavy Milwaukee Simplex manufacturing-type milling machines, with the work held in a special indexing fixture having a pneumatic cylinder for moving the tailstock forward in order to lock the work in position. For rotors of the size illustrated maximum diameter of the cutter is approximately 7 in. Both the rough and finish milling is done at a cutter speed of 750 r.p.m., with a table feed of 6.8 in. per min.

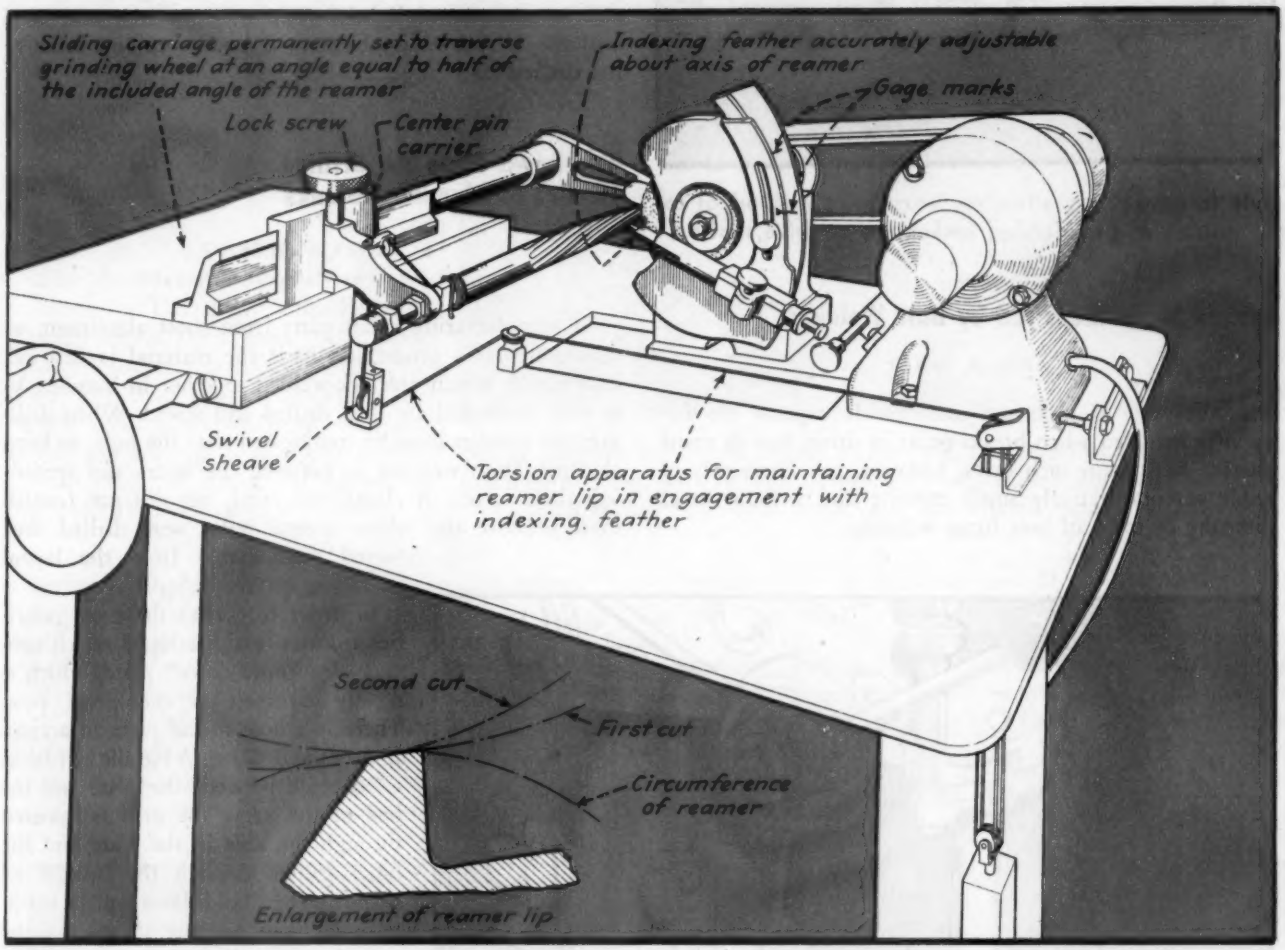
Milling machines used for these operations must be maintained in perfect condition. Spindle bearings, table gibs and other machine elements are checked once a week to keep them in perfect adjustment. A soluble-oil coolant is flooded over the work during both the rough milling and the finish milling operations.

On large rotors, the roughing cutter removes 0.040 to 0.050 in. of stock during the single roughing cut, leaving approximately 0.010 to 0.015 in. of stock to be removed by the finishing cutter. It is of interest to note that in the case of the die-cast rotors the 4½ in. diameter inserted-blade fly cutter has four carbide-tipped bits, and is rotated at 1,000 r.p.m. with a table feed of 6.9 in. per min. while removing 0.015 to 0.020 in. of stock in a single climb cut.

The special indexing fixture employed when milling lobe surfaces on compressor rotors has an adjustable tailstock which can be positioned to fit rotors ranging from 3 to 24 in. in length. Also, the center bearing in the tailstock is arranged to take interchangeable center points of either male or female type. The main shaft of the indexing headstock on this fixture is bored for a sliding fit on the end of the rotor shaft, and an extension at one side of this headstock spindle carries a split jaw which engages a rib inside one of the rotor lobes to insure accurate positioning of the rotor in order to maintain correct relationship between lobe surfaces and the index plate in the headstock. All operating controls for the fixture are located at the headstock end. These include levers for moving the indexing plunger, and for operating a clamp which locks the headstock spindle after it has been indexed to the next position, and a handwheel for turning the headstock spindle when indexing between cuts. The control valve for the tailstock cylinder is located at the headstock end of the fixture.

Practical Ideas

War-Winning Suggestions appearing on these pages were selected from these recognized as meritorious by the Board for Individual Awards, War Production Drive. They are freely offered to industry as an aid to war production


Sliding carriage permanently set to traverse grinding wheel at an angle equal to half of the included angle of the reamer
Indexing feather accurately adjustable about axis of reamer
Gage marks
Lock screw
Center pin carrier
Swivel sheave
Torsion apparatus for maintaining reamer lip in engagement with indexing feather
Second cut
First cut
Circumference of reamer
Enlargement of reamer lip

An identical angle can be ground on any number of reamers by the use of a novel indicating device, which can also be adjusted for any clearance angle desired

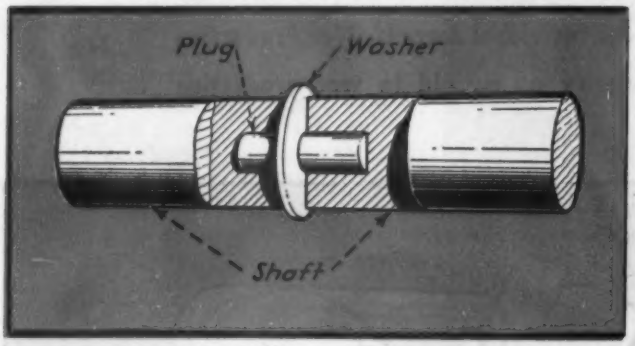
Grinder Which Sharpens All Reamers Uniformly to Standard Taper

BY ED. MASCONE AND J. D. SCHMIDT,
Permanente Metals Corporation

Taper reamers were formerly mounted between centers of a carrier, which moved back and forth across the face of a grinding wheel. The lips were maintained in correct relationship with the cutting face of the wheel by a feather or finger, made from a short piece of spring steel, or a saw blade, which served as an index for locating the various lips as the reamer was rotated. This finger was difficult to adjust to obtain the correct clearance angle for the cut and since reamers differed as to the degree of angle and cross-sectional shape of flutes, repeated adjustment of the slide and feather resulted in improperly sharpened tools and considerable loss of time.

In the device shown in the ilustration the carriage is maintained at a fixed angle with relation to the wheel, thus producing an identical angle on all reamers ground. The finger is also mounted for adjustment about the axis of the reamer, allowing adjustment for any clearance angle desired. Graduations are provided on the finger mounting for guidance in making any desired settings between a reamer and the grinding wheel. A weight-loaded cord is used to maintain the side of the lip against the finger, thereby insuring a uniform surface on the cutting face of each lip. Owing to the ease with which this device can be

handled and adjusted, the grinding of reamers can now be assigned to the less-experienced workers in the plant. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



Butt forge welding offers an inexpensive method of repairing and reinforcing broken line or drive shafts

Broken Shafts Repaired by Butt Welding

BY R. A. BRADY

Serious loss of time and considerable expense are frequently involved when breaks occur in drive, line or crank shafts. Repairs in such cases, however, can frequently be made at comparatively small expense and without much difficulty by mans of butt forge welding.

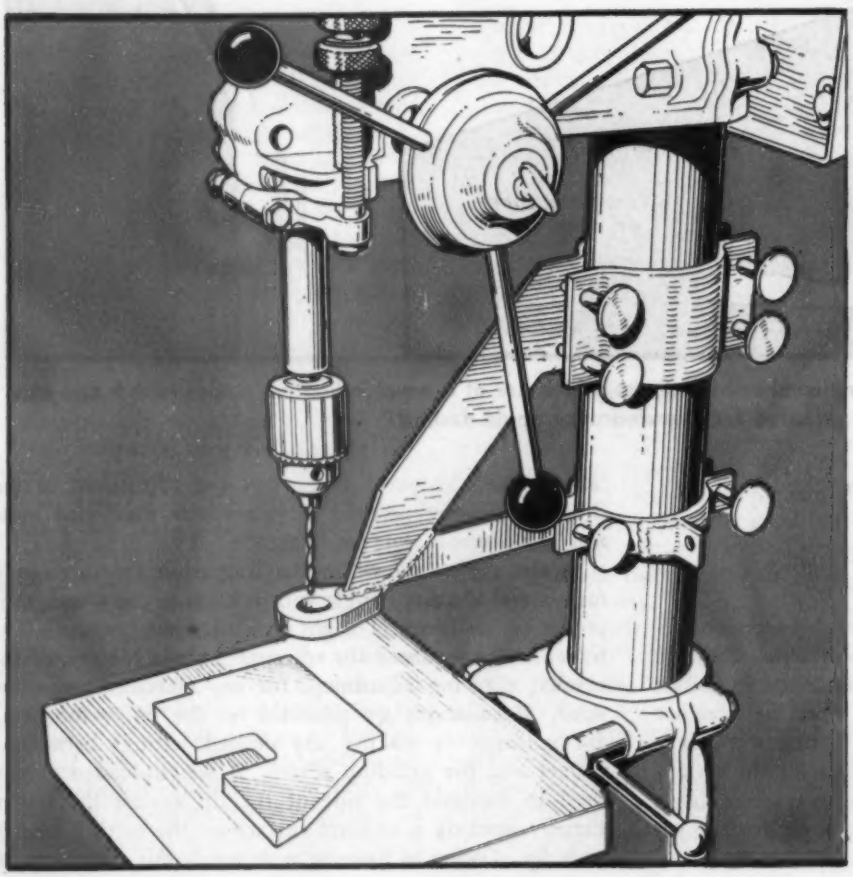
The usual method is to drill a hole lengthwise into the end of each piece to be joined to a depth corresponding to the diameter of the shaft. A pin of wrought iron, equal in length to the depth of the two holes plus the thickness of an ordinary iron washer, should then be cut to proper length and inserted in the holes in the rod ends. The ends should then be pulled lightly together, with the washer between them and the joint heated to a cherry red, then withdrawn and given a coating of welding flux and returned to the fire and heated to a proper welding temperature. The ends can then be jammed tightly together and hammered out lightly. The wrought iron and steel will adhere and the joint can be turned down on a lathe to the desired size.

Hold-Down Plate for Drilling Bundles of Aluminum Blanks

BY HENRY W. BECRAFT,
United Air Lines Transport Corporation

In manufacturing small parts from sheet aluminum, or duralumin on a production basis the material is first cut into blanks which are tack-welded together in bundles ½ to 1 in. thick and are then drilled and sawed. When drilling, the bundles must be compressed near the hole, to keep shavings from working in between the layers and spreading them apart. A clamp was tried, but did not furnish even pressure and where several holes were drilled they varied considerably from the layout positions.

In order to correct these irregularities a device was developed which consists of a "hold-down" plate, which is rigidly clamped to the press post. There is a hole in the plate to accommodate the drill bit. A bundle of blanks is squeezed between the plate and the bed of the press, the drill is lowered through the hole in the plate and the hole drilled through the bundle of blanks. The "hold-down" plate maintains an even pressure all around the hole being drilled, insuring straight holes, true to location, with no shavings between the layers. The conical depression around the hole in the plate acts as a reservoir for the cutting lubricant by keeping it confined to the hole being drilled; otherwise it would spread over the whole surface of the work. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



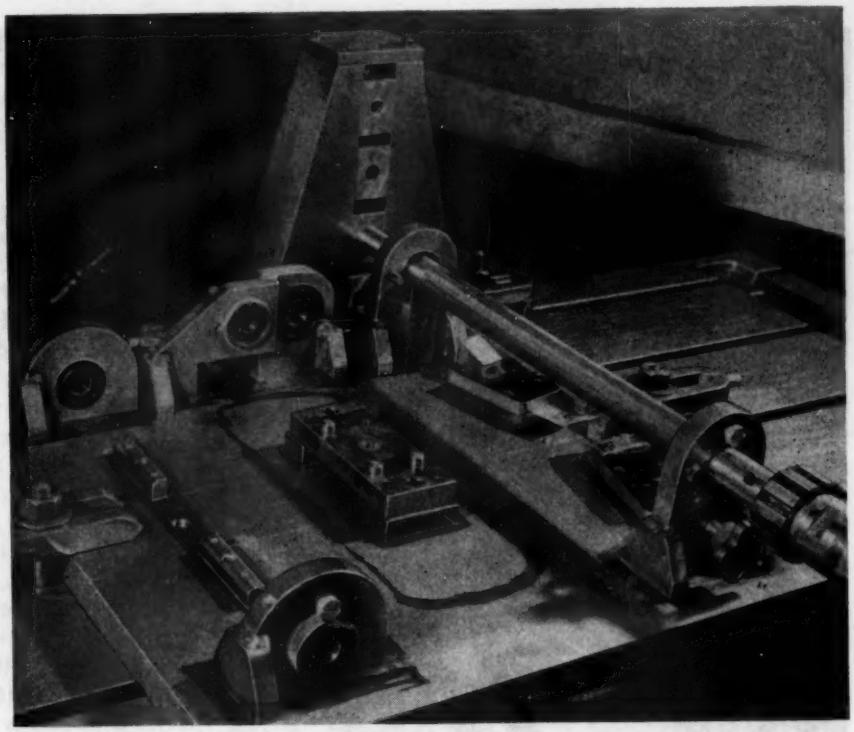
Tack-welded bundles of aluminum, or duralumin are firmly held in place and accurately drilled through a hole in a plate which maintains localized pressure at the point of drilling

Tailstock Prevents Chatter Of Boring Bars

BY R. E. STONE,
Northrop Aircraft, Inc.

An auxiliary tailstock for boring machines has been designed to support boring bars on the end opposite to the chuck. The tailstock is equipped with four adjustable bronze bearings ranging from ½ in. through ⅝ in. and ¾ in to 1 in. In operation the tailstock is clamped on the boring mill table. The boring bar revolves, one end in the chuck and the other, the free end, in the tailstock. The work is clamped to the table between the tailstock and the chuck where the cutters function.

Rough holes can be reamed to fine tolerances at any reasonable distance from the chuck without cutter chatter, due to the fact that the boring bar is supported at both ends. Back spotfacing and radius cutting, either forward or back, with any amount of arc, may also be accomplished with this auxiliary tool. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

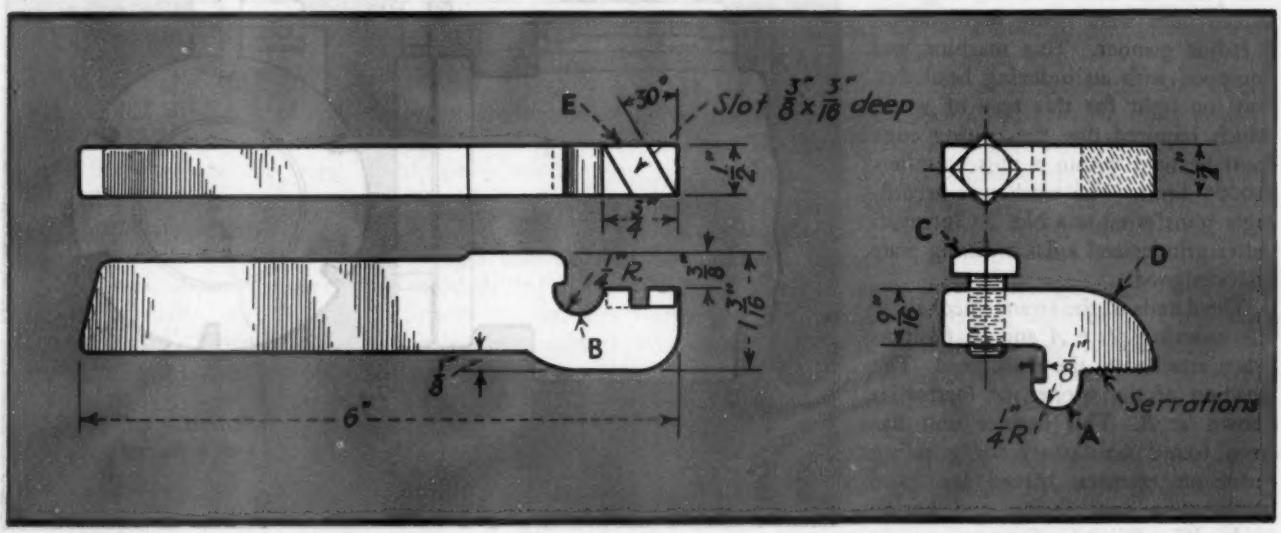


Boring bars are supported at one end by the chuck and at the other by the tailstock bearing, with cutters positioned along them. Rough holes can be reamed to fine tolerances because of the double support of the bar

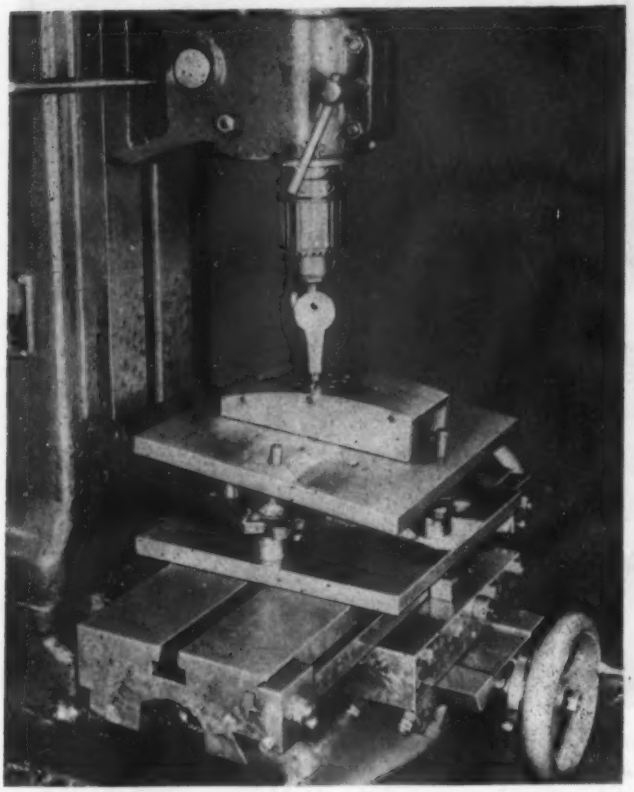
Lathe Toolholder with a Wide Range of Uses

BY ROBERT MAWSON

There are many types of lathe toolhoders and each type has some useful feature, but they are frequently not adaptable to a wide enough variety of jobs to be entirely satisfactory. A toolholder which has a wide range of use in our shop is shown in the illustration. It has a contoured surface, *B*, into which fits the projection shown as *A*. The construction of it allows the part *D* to rotate within limits with the main, or lower part, of the holder. The setscrew, *C*, when tightened or loosened, brings into play this rotating action and also provides a leverage action which exerts considerable pressure on the toolbit in slot *E*, thus holding it securely. The serrations on *D* also assist in holding the toolbit. The toolbit slot *E* can be made to hold either straight cutting, left, or right-hand turning tools by making it at any desired angle.



Leverage action provides a firm hold on cutting tools and the slot can be made at any angle for straight, left or right-hand cutting



Set-ups for 90 deg. drilling of contoured parts have been simplified by a device which can be set for locating and drilling such surfaces at any compound angle

Device for Drilling at 90 Deg. To Contoured Surfaces

BY RALPH L. SKIFSTROM
Northrop Aircraft, Inc.

The method of drilling holes at 90 deg. to contoured surfaces followed previously at this plant was one which included the use of shims in setting up the parts to be drilled on the bed of a vertical milling machine. This method, because of its nature, took considerable time and was therefore costly.

In order to reduce the time required for set-ups for such jobs, a device was designed which consists of two metal plates connected at their centers by a swivel post. At the center of the edge at each side and between the plates, there are adjusting screws, by means of which the top plate may be set to hold contoured parts at any desired compound angle for drilling.

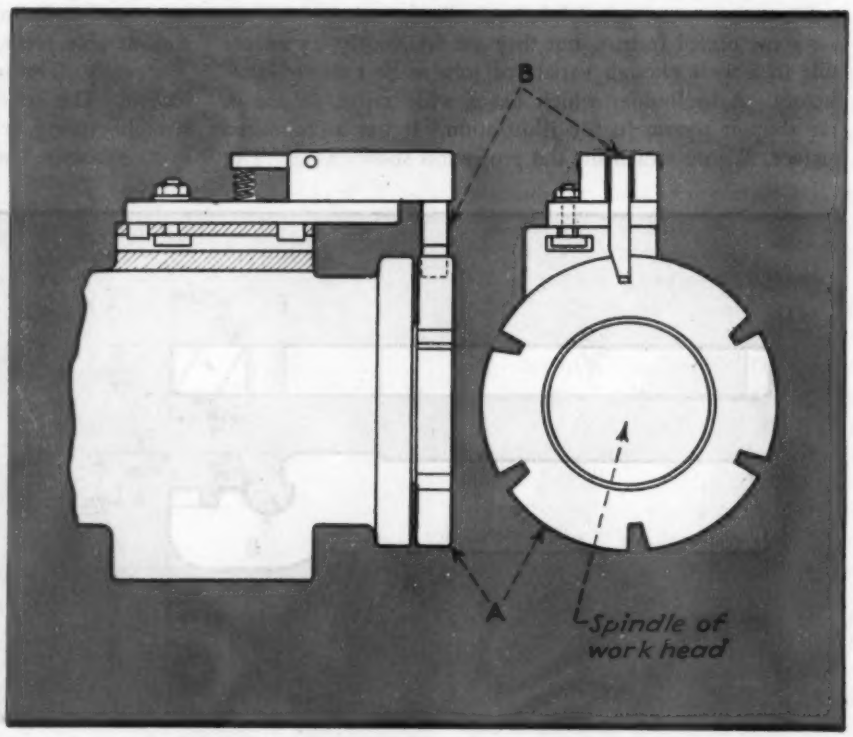
Any part pre-scribed for hole locations, within certain dimensional limits, with a single or compound contour, can be bolted to the device, which is mounted on the bed of a vertical milling machine, with a dial indicator positioned in the chuck of the mill. The workpiece is positioned under the indicator by manipulating the forward and lateral adjustments of the mill bed. The indicator is then replaced by a drill. The device is used primarily for making master tools where a high degree of accuracy is required. This method saves approximately 15 hr. per week as compared with the time required by the shimming method followed formerly. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

Cutter Grinder With Indexing Plate Used for Tool Grinding

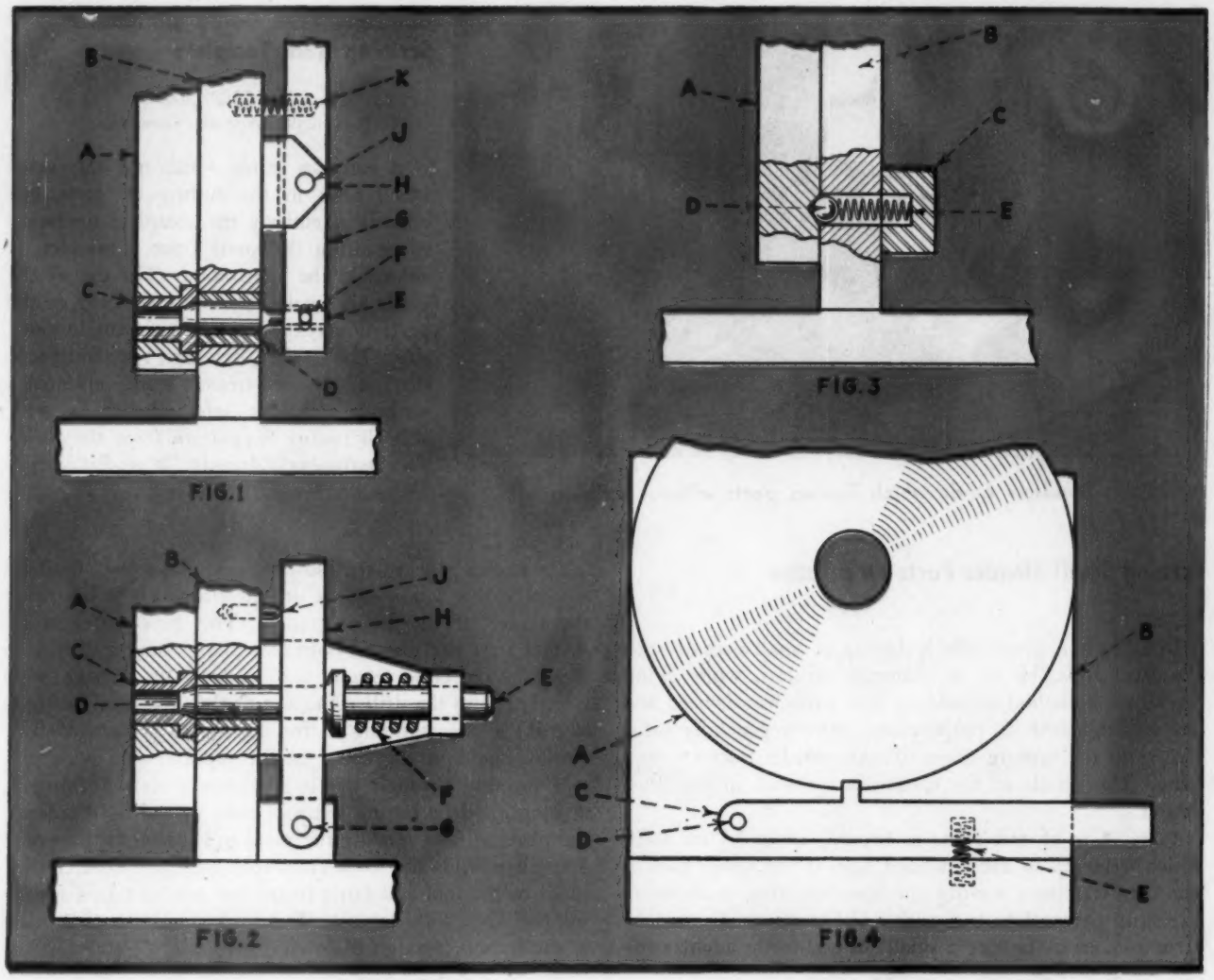
BY EARL KRACKOW & JACK DELANEY
Packard Motor Car Company

In the machine repair department of this plant the dulled cutting edges of thread hobs were being reground on a radius grinder. This machine was equipped with an indexing head, but was too light for this type of work, which required that the cutting edge must be held within a plus or minus 0.0005 limit. The work was accordingly transferred to a No. 2 Cincinnati cutter grinder and a flat indexing plate was designed.

The details of the arrangement show the indexing plate *A* and its position when attached to the work head. The position of the tripper, or locator, is shown at *B*. This heavier unit has been found satisfactory for grinding flutes on reamers, thread taps and combination spot facing and boring tools. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*



A cutter grinder, with an indexing plate, grinds flutes on reamers, thread taps and combination spot facing and boring tools



These radial drill jig locking devices have proved satisfactory for many types of jobs ranging from heavy precision work to light parts and jobs where costs must be held down

Radial Drill Jig Locking Devices

BY EARL J. BREEDING

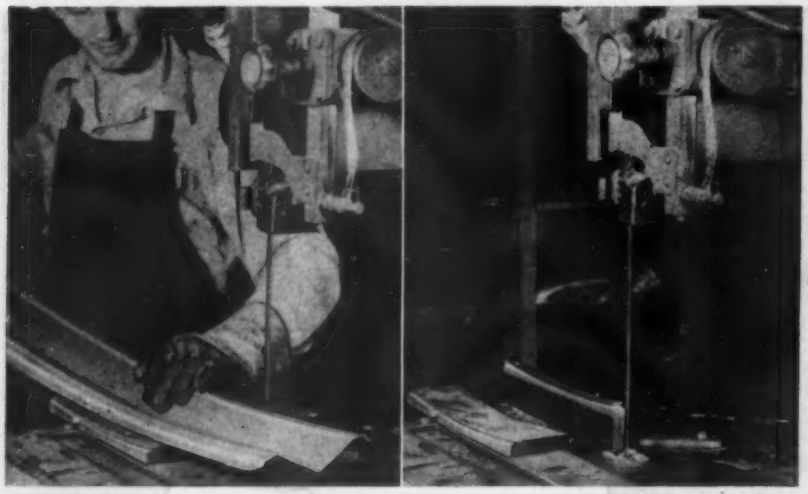
Four radial drill jigs of various types, having index plates on which a positive locking mechanism is required to lock the plate and the work directly under the center line of the drill press spindle, have been developed and have proven satisfactory.

In Fig. 1 the index plate *A* carries a locater bushing, *C*, in proper position to locate each hole to be drilled in the work. This bushing has a shoulder to prevent it from slipping, which would otherwise be caused by the continual dropping of lockpin *E* into place. Its bore is also tapered 15 to 30 deg. to allow a firm seating of lockpin *E*. In the stationary member, or upright *B*, there is a drill jib bushing of correct size to allow a slip fit with part *E*. Pressure from spring *K* holds the plate and work locked, by keeping lock handle *G* in the outward position. The handle is pivoted in lock saddle *H* by dowel pin *J*. The lock pin *E* is also fastened by dowel pin *F* through slots in *G*. The work is then revolved and positioned by pushing inward on the handle *G* and turning the work until the next locator bushing *C* comes into line with the lockpin.

In Fig. 2 the layout is the same except that the spring *F* is directly behind the lockpin *E*, giving a more positive seating. The handle, *H*, is mounted as in Fig. 1 by dowel pin *G* and a stop pin, *J*, is placed in upright *B* to keep the handle from dropping losely against the jig. This locking device is excellent for heavy work, provided pin *E* is of sufficient diameter.

Fig. 3 shows a locator that is excellent for drilling light casting of Dowmetal, cast iron, or aluminum. It will handle small drilling in steel, but is not recommended for the heavier drilling jobs. Indents are placed at the proper locations in the index plate *A* and steel ball *D* is held in place by spring *E*.

Fig. 4 is an index arrangement that can be built cheaply for use on jobs where the cost must be held down and on jobs where positive indexing is not required. The index plate *A* is notched to allow the step on handle *C* to fall into the notch. It is mounted directly on upright *B* by dowel pin *D* and is held in locked position by spring *E*.



Bandsaw guide which finishes parts without scribing

Bandsaw Trim Guide Eliminates Scribing from Templets

BY VICTOR SASEK
Douglas Aircraft Company

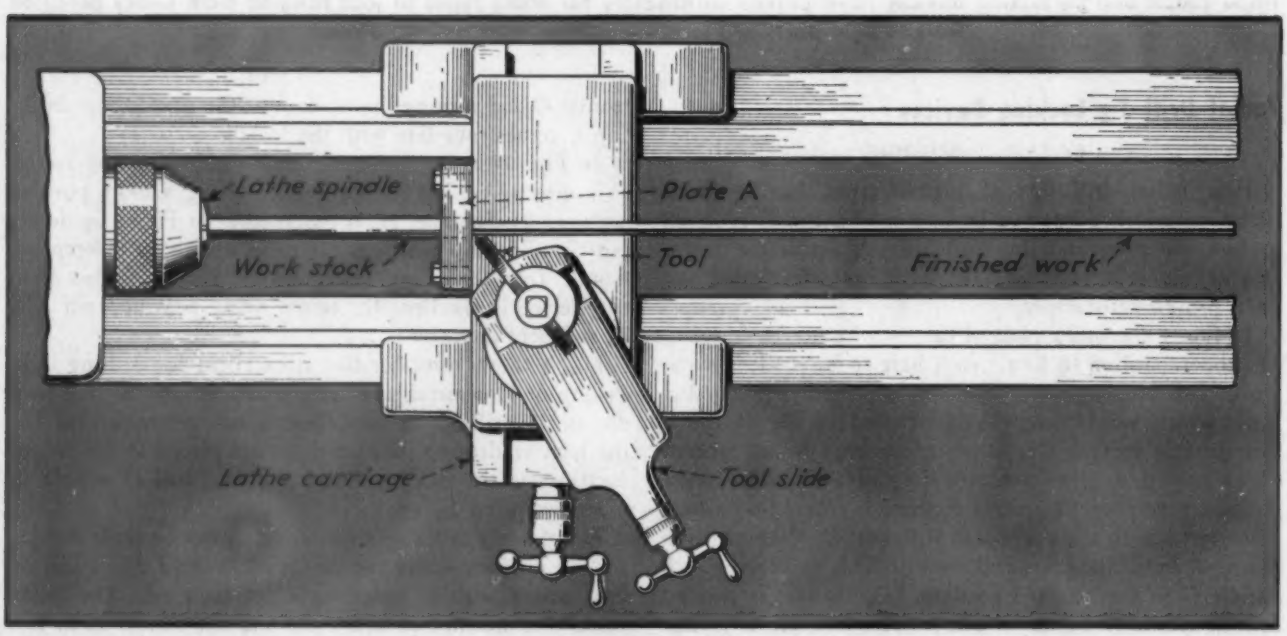
A bandsaw guide which not only saves much time in the cutting of parts, but eliminates entirely the complete operation of marking the parts from a templet, is shown in the illustration. The use of the guide also makes trimming or filing of the parts unnecessary, as they are cut to exact size. The device, therefore, speeds up production, insures neater work, eliminates scribing and is a safety device as well. *War Winning Suggestion from the Board for Individual Awards, War Production Drive.*

Turning Small Slender Parts on a Lathe

BY FAY E. CLARKE

In order to eliminate the springing of small sizes of brass and steel rods, 1/8 in. in diameter, or less, while being machined, a method of holding such parts was devised and has accomplished its purpose and proven generally satisfactory in the turning down of such slender material on a lathe. The details of the method are shown in the illustration.

Plate *A* is of cast iron, or bronze, about 1/2 in. thick which is bolted to the left-hand side of the lower part of the lathe carriage, leaving the toolslide free to move in adjusting the tool to the work. The same results may be accomplished by bolting a small plate onto the regular follower rest in place of the movable jaw. This plate must be so placed that a hole can be drilled through it in line with the center of the lathe spindle. This hole can best be drilled after the plate is bolted in place, using a drill in a chuck in the lathe spindle and feeding the carriage with the plate onto the drill. The size of the hole must be right to make a snug running fit for the rod to be turned. The work is held in the collet in the regular way, with one end running through the hole in the plate. Turning is accomplished by setting the tool close to the right side of the plate, *A*, and feeding the plate and tool onto the work. The plate holds the work from springing from the cutting point of the tool and fairly heavy cuts can be taken, finishing the work with one cut. The work should be well oiled where it runs through plate *A*.



A plate with a hole drilled to provide a snug running fit, according to the size of rod to be worked, provides sufficient support to prevent springing

Pneumatic Clamps Simplify Tooling

By C. H. BODNER, Tool Engineer, Lockheed Aircraft Corporation

Lockheed tool engineers make full use of pneumatic clamping by stocking standard air vises and cylinders, and adapting them to machining set-ups

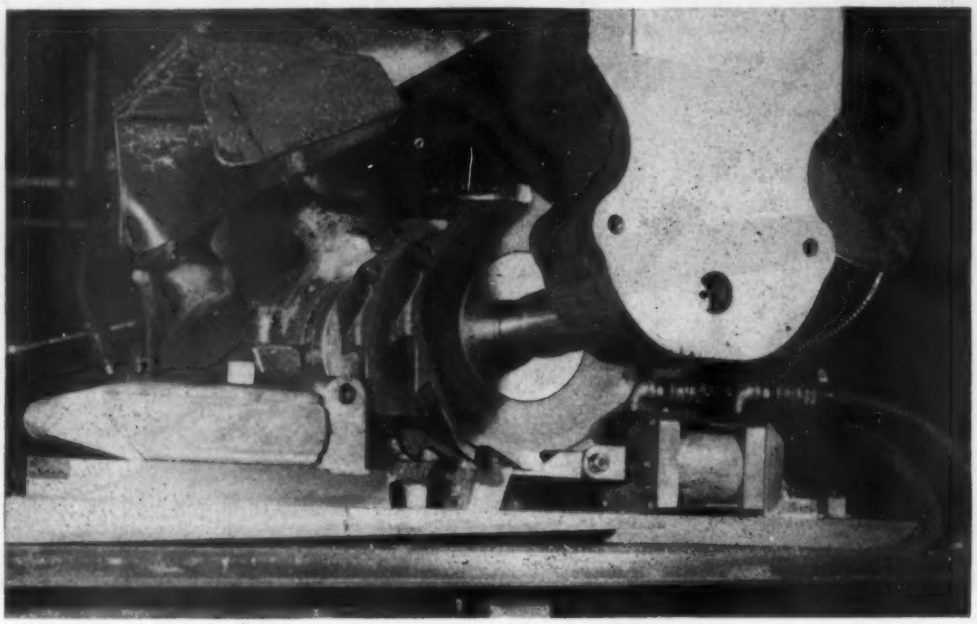
PNEUMATIC CYLINDERS have been substituted for ordinary clamping methods on fixtures for holding workpieces in place during machining operations at the Lockheed Aircraft Corporation. They make unnecessary the hand labor formerly required in loading and unloading work in process, such as tightening and loosening nuts and bolts.

The rapid increase in production at this plant made possible by carbide-tipped milling cutters and high-cycle milling called for a more rapid means of loading and unloading jigs and fixtures to keep pace with the increased machining speeds. Since the cutting time, even on SAE 4130 steel parts, had been reduced to a matter of seconds, it was not logical to take several minutes for clamping and unclamping.

This objective had to be accomplished without the use of complicated multiple-part fixtures. Lot sizes in this plant range only from 50 to 500 pieces, and the total number of parts on a contract was not sufficient to justify the use of expensive tooling.

Standardized pneumatic clamping cylinders proved to be the answer. These were either purchased or made in lots in the plant machine shop to cover a wide range of clamping pressures. Then fixtures were designed to use these standard cylinders and selected from the tool design standards manual. In many cases commercial air-actuated vises were used, so that it was only necessary for the tool designer to supply special jaws for the particular workpiece under consideration.

It may seem rather expensive to assign one or two



An unusual application of pneumatic clamping in a straddle milling operation on a high-cycle milling cutter in which two cuts are taken, one a rough 1/8 in. cut, at a rate of 200 pieces in 32 min., while the time for the finish cut of 1/16 in. is 22 sec. The 8-in. cutters rotate at 9,000 r.p.m. and the feed speed is 225 in. per min., making a rapid loading cycle essential

cylinders to a fixture for the life of a tool, but experience has shown that such is not the case. The cylinders are salvaged when the tool becomes inactive, and the clamping units have made it possible to simplify fixture design, so that in many cases a reduction in overall costs of the tool is greater than the value of the cylinder.

Development of Pneumatic Clamps

One of the first steps in applying pneumatic power for clamping at this plant was the use of a Hannifin air vise for which jaws were made to suit various simple forgings and bar stock jobs. The movable blocks are attached to pistons in cylinders that are open to a grease chamber which distributes the pressure evenly. The air cylinder in this vise is 6 in. in diameter and contains two pistons separated by a partition, but both delivering power to the movable jaw. This vise develops 3800 lb. gripping pressure, with 80 lb. line pressure.

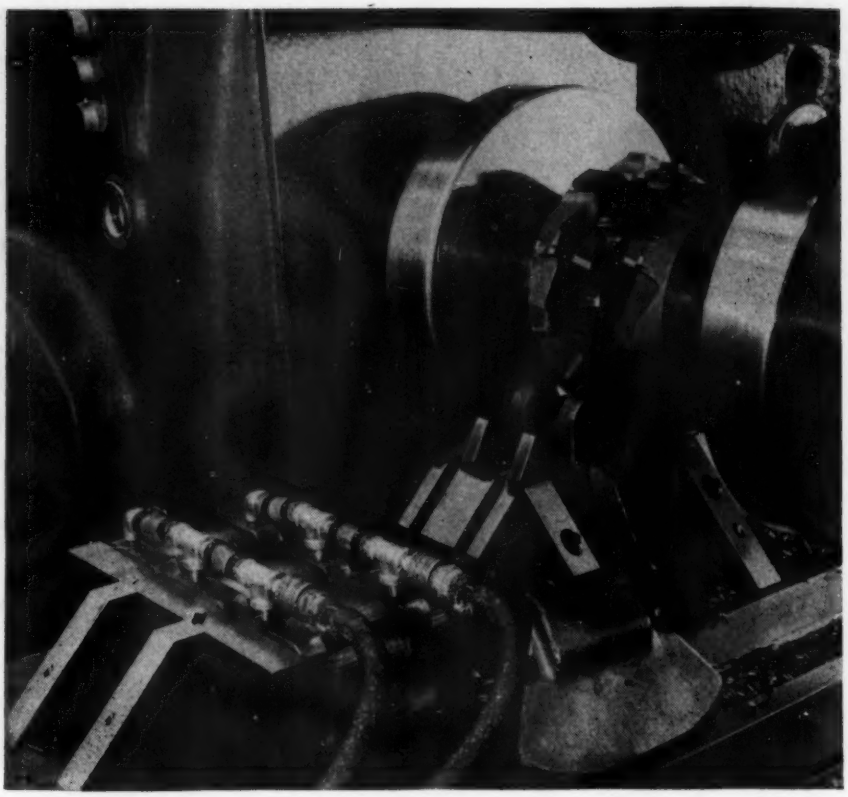
Since the overall height of this vise is 7 in., it limits the size of the work that can be handled under some vertical milling machines. To overcome this limitation, a new "double-barreled" vise was designed. This unit has four pistons in two cylinders and will deliver 2200 lb. pressure with 90 lb. line pressure. The overall height is only 4 in. The vise clamps directly to the table giving it a wide range of adjustments and may be mounted across the table by means of an auxiliary base. A four-way valve is mounted on the cylinder head. Total time required to change parts in this vise is 5 sec. or less.

Another standard unit is a smaller size pneumatic vise which is often used for holding parts while drilling.

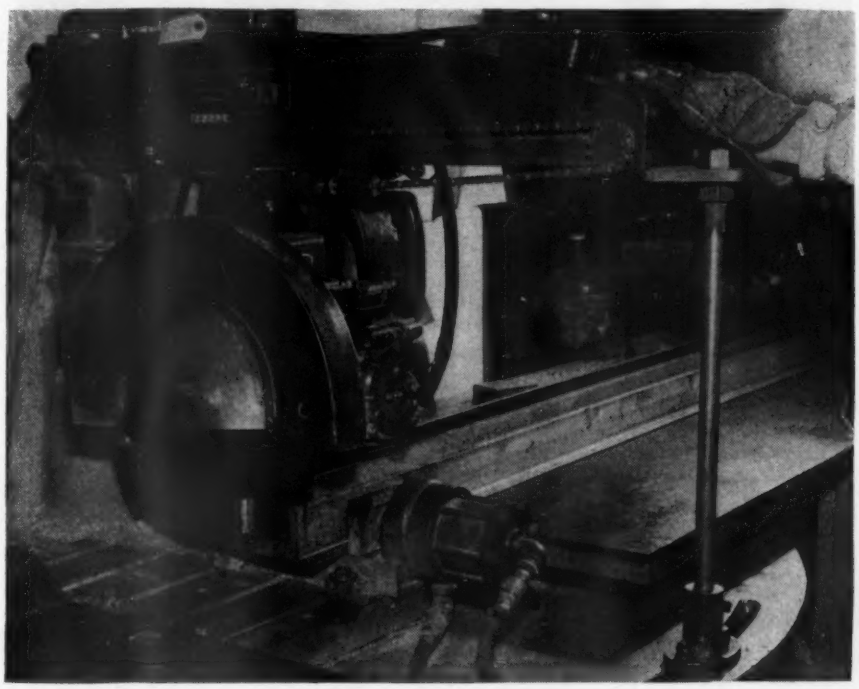
An important consideration in clamping parts is operator fatigue. When 20 to 50 parts an hour is the average production rate, clamping effort does not consume much energy, but when output is increased to 400 parts an hour it is essential to make the work easier for the operators so they can keep up with the machine without fatiguing effort.

Maintenance on the cylinders and pneumatic vises has been unexpectedly low and a surprising large number of jobs have been handled with no tooling outside of tailored jaws for the vises. Three important advantages have been gained from the use of these practical tools: increased production, decreased operator fatigue and simplified tooling.

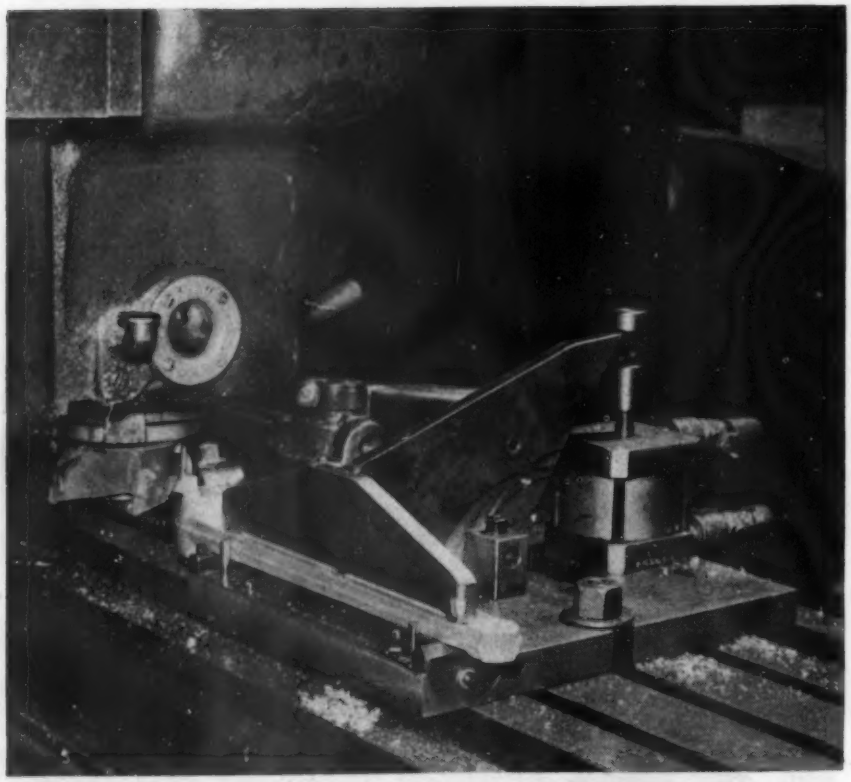
Typical examples are shown of pneumatic vises and fixtures in the following pages; many more applications have been made and are now in use.



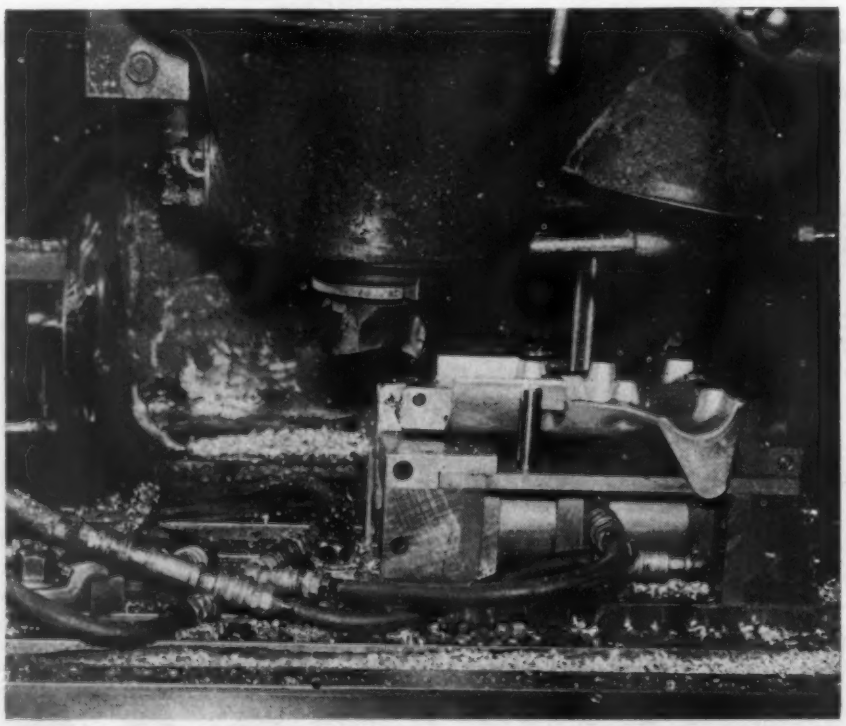
Three standard air cylinders, coupled to a self-equalizing toggle for rigid clamping as an aid to carbide-tipped cutter life, are used to hold an "axe head" casting. The cylinders are controlled by a four-way hand valve. The machining time is 12 sec., with 6 sec. required for changing parts



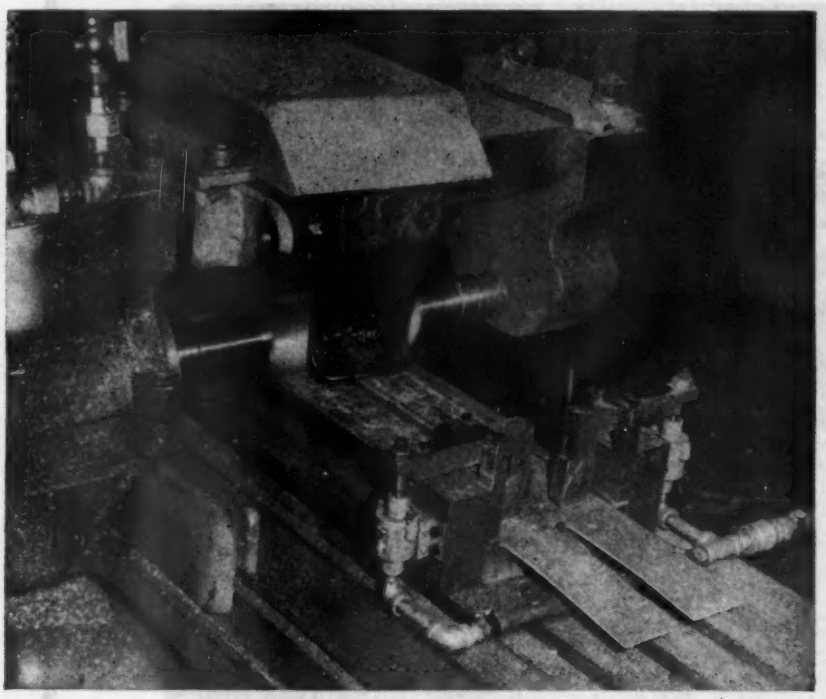
A pneumatic vise is used to hold a beam in a cutting operation, the total time required to trim both ends of the beam to finish length at a single angle being well under 5 min. The vise is controlled by a foot valve, leaving the operator free to handle the workpiece



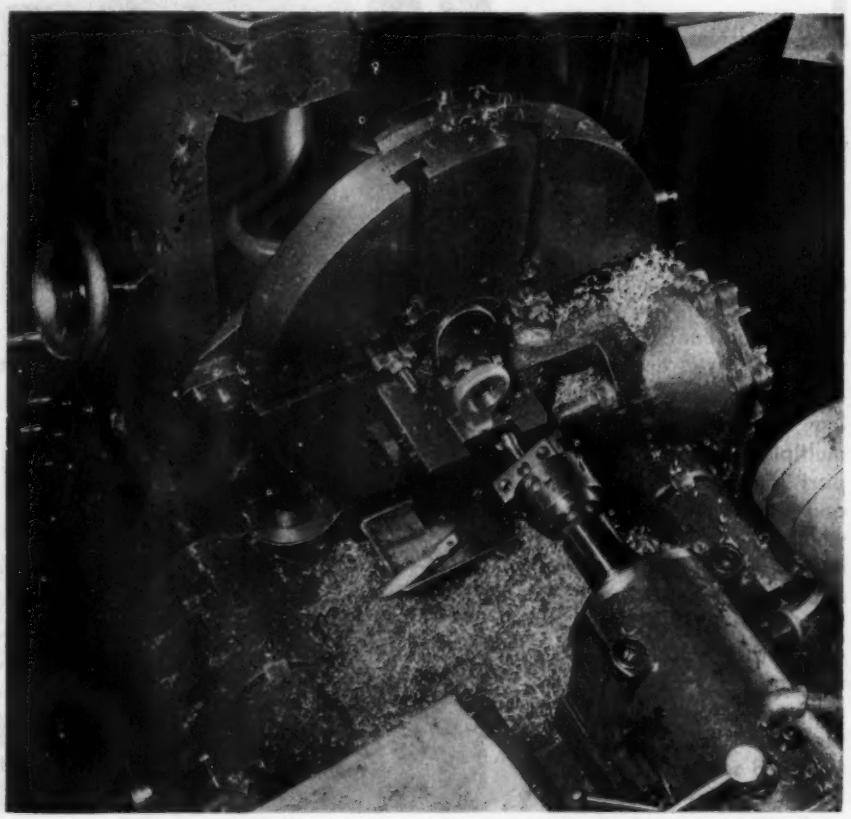
Pneumatic clamps automatically compensate for part variations in forgings and castings, and supply uniform holding pressure for each piece, eliminating the many manual adjustments required when the usual types of jigs and fixtures are used. The loading time is 5 sec.



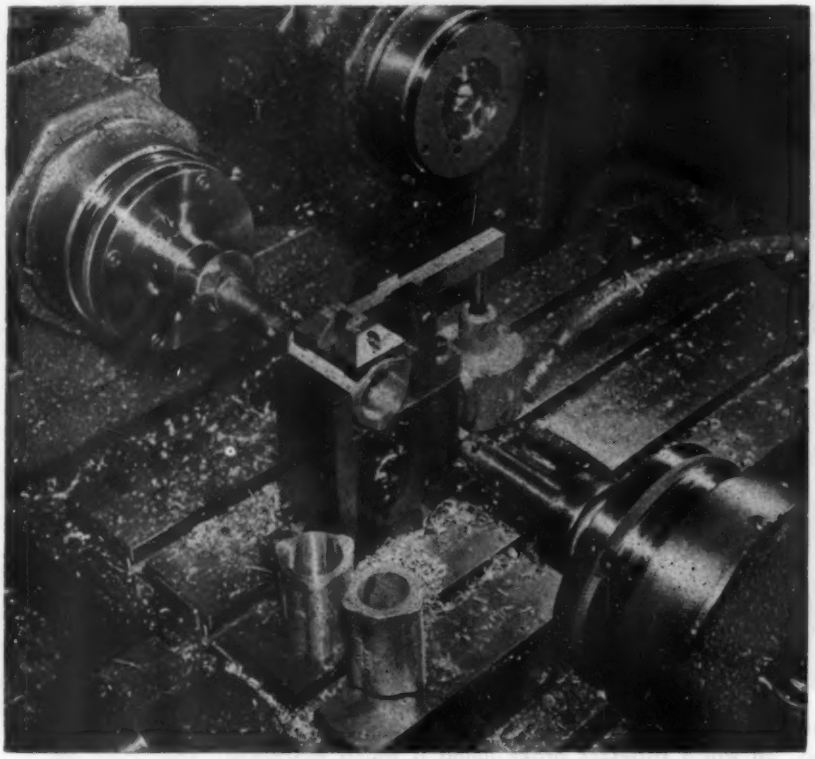
Two standard air cylinders are placed end to end to hold a forging while the pads are being milled. One cylinder has a 1½-in. stroke and the other a ¾-in. stroke, this arrangement being necessary to secure clearance for loading the part in the fixture. The loading time of 7 sec. is the shortest part of the machining cycle



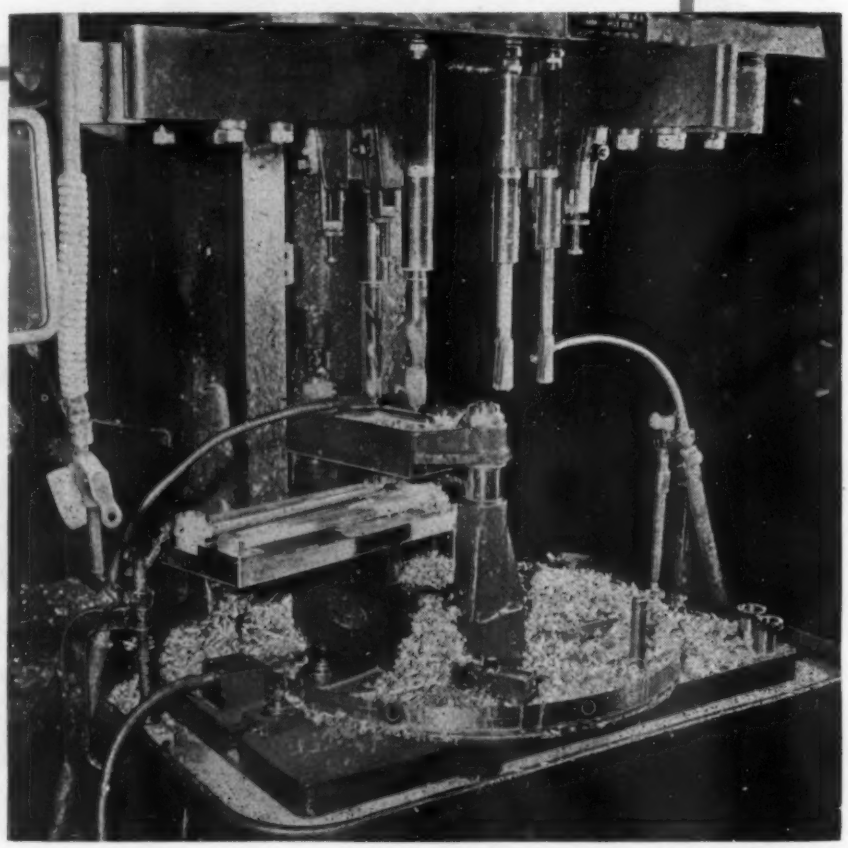
Two Mead midget air cylinders are mounted on a milling fixture on a helical slab mill, on which asbestos brake lining is being machined. The r.p.m. is 9,500, the feed speed 225 in. per min. and the loading time averages 5 sec. per part per end. A foot valve operates the cylinders, leaving the operator's hands free to shift parts



Precision work at a production rate on a horizontal boring machine is made possible by the use of a diaphragm-type pneumatic vise used as part of the fixture. It is operated by a foot valve, leaving the operator's hands free. The loading cycle is 4 sec. and the boring time 5 sec.



A sand casting is rough bored and faced on one end by the spindle at the right, while the other spindle does the finish boring and facing at the other end. A foot-controlled air cylinder supplies clamping power for the fixture used in this double operation. Loading and unloading of the part is done in 6 sec.



A small steel housing on the left side of the table contains an air-controlled piston with a tapered end used as a locating pin for an indexing table mounted on a multiple spindle drill. The part is drilled at both ends and then reamed, after which the finished part is removed and another part inserted in the starting position. Each operation requires rotation and relocation of the table by the pneumatic piston which is foot controlled. The loading time is 8 sec. and the indexing time 4 sec. each way

Drilling and spot facing of six attachment lugs on a welded steel tube assembly requires clamping and unclamping the part 12 times during the cycle, which formerly required a minimum of 16 min. The part is now located under the drill and held by an air clamp for all these operations and the clamping time totals 24 to 30 sec., compared with a minimum of 16 min. with ordinary jigs and fixtures

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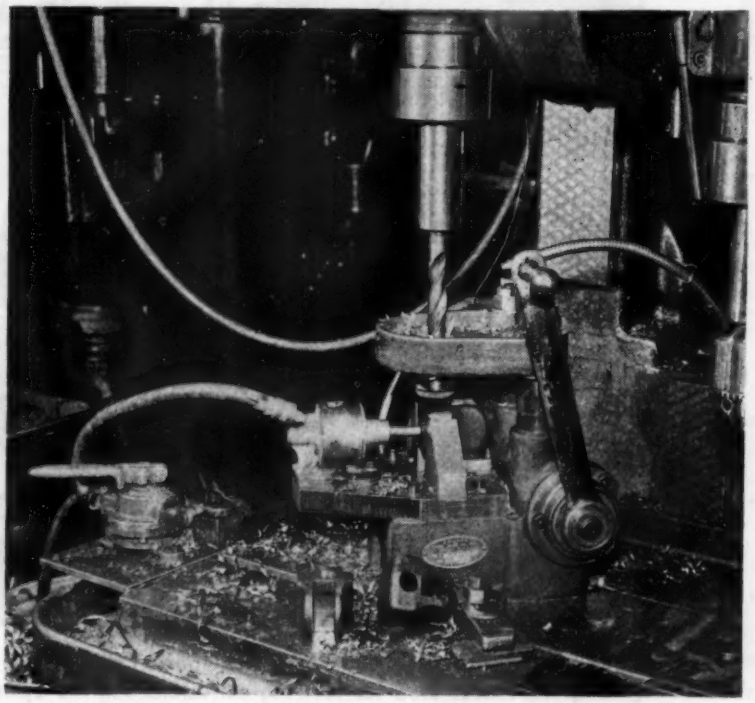
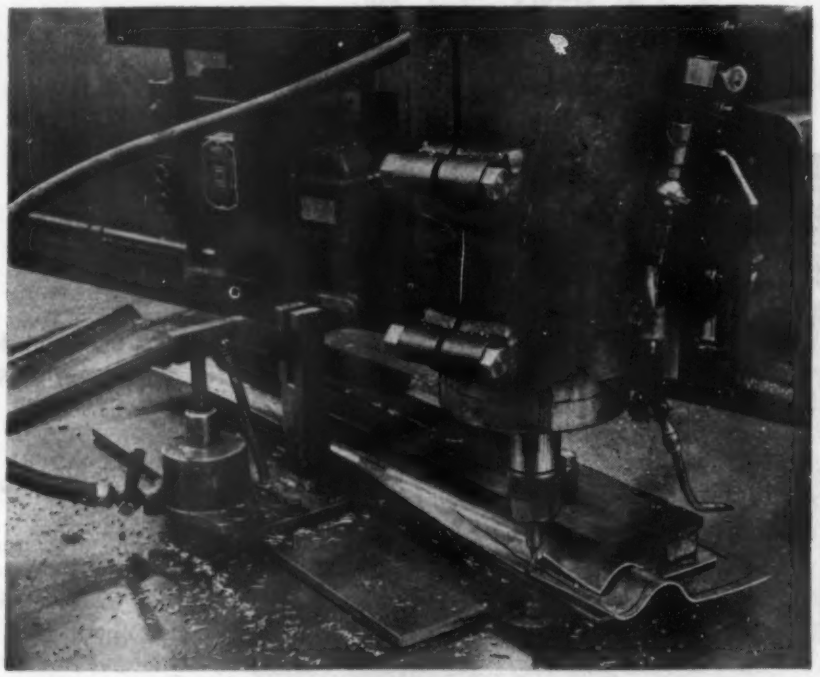
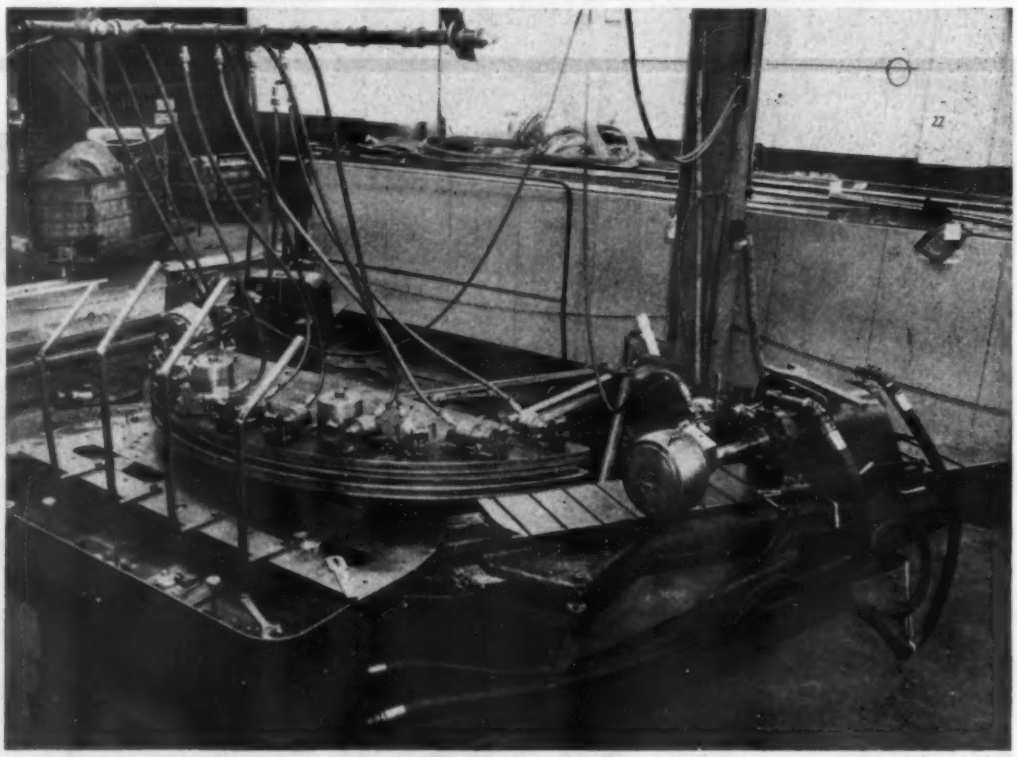
An air cylinder is used as a part locator on a standard drill jig holding a forging. The hole must be drilled parallel to a milled slot and the locating is done from the slot. The time of the loading cycle is 6 sec.

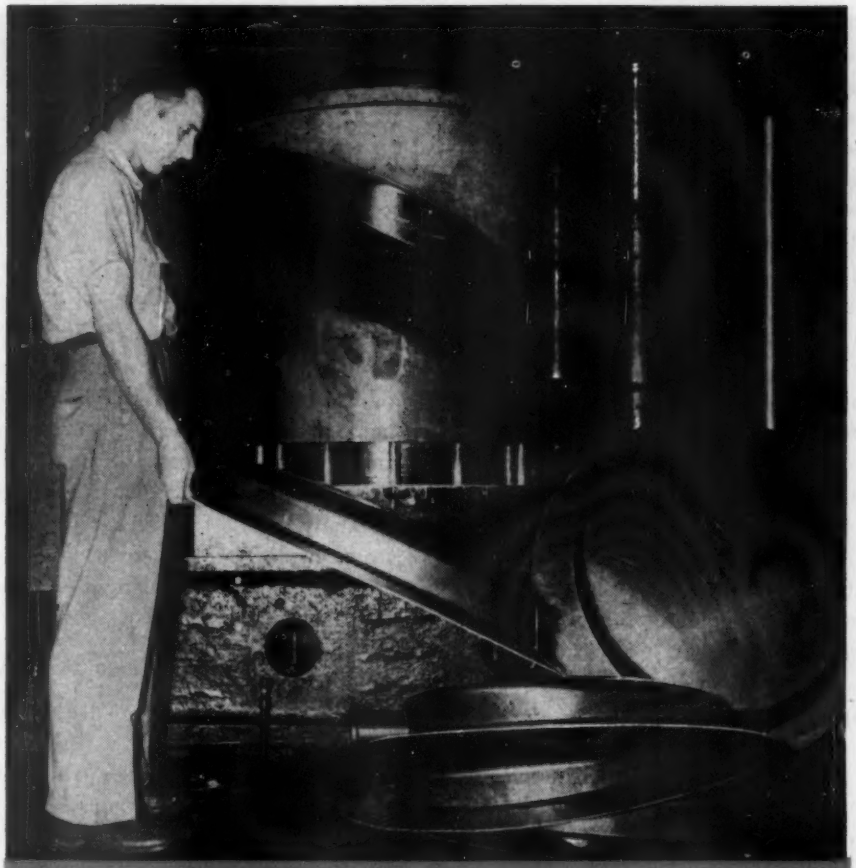




Two screw-type clamps which were formerly used on "sandwich" type router blocks were replaced with a vertical-type air cylinder clamp and the change resulted in a saving of 16 sec. in loading time per part



Eleven standard toggle units, with pneumatic cylinders for power, are used for opening and closing the blocks used for forming extrusions. All the cylinders are controlled from a single overhead valve and after a set-up is made the only effort required of the operator is to place the part in position and manipulate a number of control valves



Dies have been designed with working surfaces at angles up to 45 deg. to the bolster. On these dies the transverse force is controlled by a heel on the draw ring, which bears on outer surface of the female die

Draw Presses Simplify Metal Working Jobs

BY MERTON J. STEVENS, Georgia Division, Bell Aircraft Corporation

Method eliminates drop hammers for processing aluminum parts. Changeover effected savings in the costs of dies and set-ups

THE GEORGIA DIVISION of the Bell Aircraft Corporation found it advisable recently to change a large number of sheet metal forming jobs from drop hammers to draw presses. This change was accomplished in a minimum of time with equipment on hand, and a minimum of die and set-up costs. The metal to be drawn was aluminum or aluminum alloy 0.025 in. to 0.156 in. thick. Three hydraulic presses, single-action machines, with die cushions, were used. The largest was of 500 tons capacity on the ram, 175 tons on the die cushion, with 50 inches of daylight above the bolster. Die-making equipment included a foundry capable of casting aluminum, Kirksite or lead, a machine shop with all standard equipment, including a large-capacity boring mill and planer, but omitting a profiler.

The die cost had to be held low because in aircraft production it must be amortized with a comparatively small ultimate number of parts. It was also necessary to control set-up costs because of small runs. The resultant design is noteworthy because of its simplicity in manufacture and in set-up. To date all dies have been made completely of Kirksite. Lack of finishing equipment, other than boring mill and planer, necessitated exceptionally close work on plaster patterns to insure castings which could be readily finished by hand. The dies are of standard three-piece construction—punch, female and draw ring. There are, however, no guide pins, no integral knock-

out arrangements and no beads on the draw rings, except in the case of a few circular dies.

In a few cases it has been necessary to design dies with working surfaces at angles up to 45 deg. to the bolster. On these dies the transverse force is controlled by a heel on the draw ring bearing on the outer surface of the female. The draw ring, thus controlled, guides the punch. On straight draws, in which transverse forces are absent or neutralized, the punch is guided by the forming metal, but in these angle dies the resistance to line-up is sufficient to shear the work.

The die as a unit is placed in the press by a fork truck. The ram is brought down and the female bolted to it. Both female and draw ring are cored in the foundry to have one-inch holes in the sides, the holes in the female being above the holes in the draw ring. Iron rods bent in U-shapes are inserted in these matching holes and the press raises the draw ring to permit placing the pins to the die cushion. After a trial stroke, in which strips of scrap are used to center the punch, the press is ready for operation. One man can set up the largest die in ten minutes, a substantial advantage when runs are small.

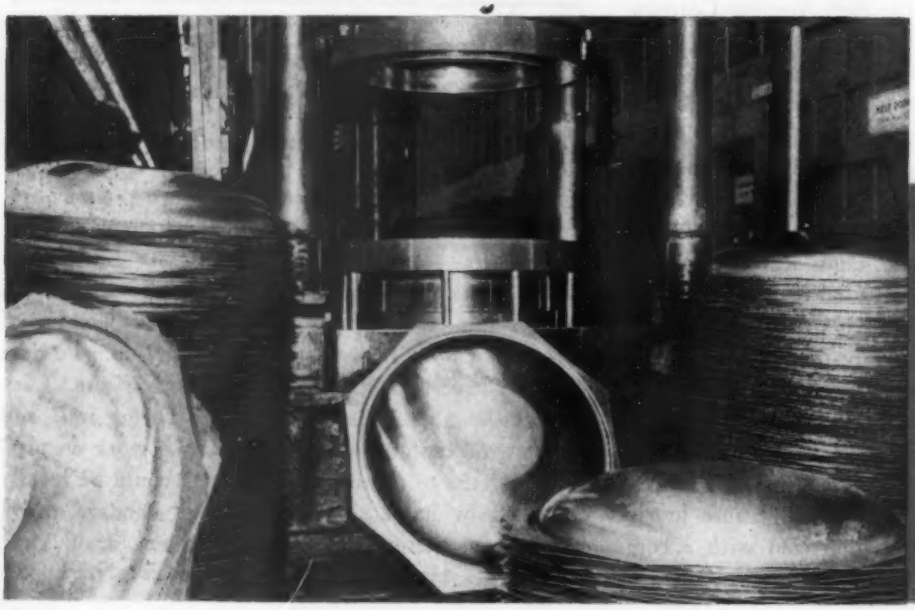
All punches are vented to prevent pick-up by vacuum. It has been found that if the compound used is not too thick, there is no tendency for the punch to pick up after the first or second part. Since the presses used are comparatively slow and the punches are heavy, no effort has been made to bolt punches to the bolster. On all simple shapes it has been found feasible to make the female a simple ring to engage the draw ring, without a true female center. This eliminates the doubtful advantage of "bottoming out the wrinkles," but cuts down cost and makes a better die at the start mandatory.

An air knock-out is used in forming straightsided shapes. This is a square of sheet metal with an air pipe to its center and a two-way valve on the outer end of the pipe. The sheet is pinched between the female and the ram, with the air pipe extending to the edge of the ram through one of the T slots. An air hose is connected to the two-way valve, permitting the operator to blow parts out of the die. While this is not as satisfactory as a mechanical knock-out, it is readily adaptable to all dies and has also resulted in a saving in cost.

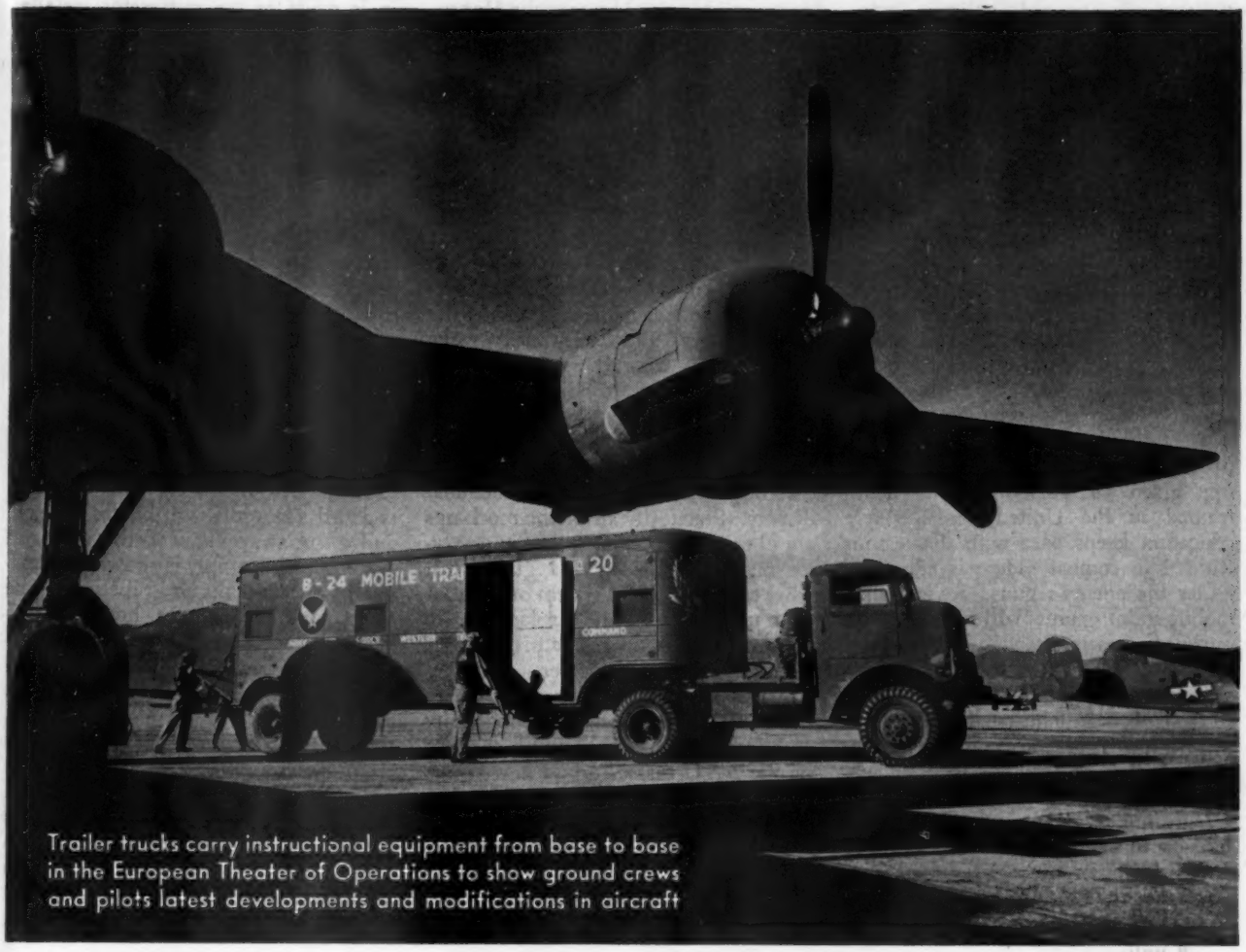
On certain severe draws it was found to be too difficult to reach the desired depth of part when drawing over the desired radius. This was corrected without making a first stage die by increasing the radius of the female and drawing to the desired depth, then restriking in the same die, using an auxiliary ring with the desired radius, this ring being bolted to the female. Some warpage of the material occasionally results from heat-treating and this restrike is now made after heat-treating before the metal has set, thus removing warping and correcting radius at the same time.

Die Wear at a Minimum

In eight months only one die has been reworked because of wear and little rework is anticipated. Burrs must be removed, however, from all blanks which have been cut with a rotary shear, or cut by any method which leaves a severe burr, to avoid damaging the working surface of the die. In making dies the plaster shop and foundry crews work from templets and part prints. No tool prints are made. In the beginning of the program a few detailed sketches were made, but this practice was discontinued when the die makers became familiar with the limits of the presses and the metal to be formed. While these dies are considered to be "flexible tools," they are not to be considered as temporary tools. There is no apparent need at this time for any changes in design or materials.



★ The dies used are of standard three-piece construction, punch, female and draw ring. The female die and the draw ring are cored in the foundry for 1-in. holes in the sides, to enable lifting by the press



Trailer trucks carry instructional equipment from base to base in the European Theater of Operations to show ground crews and pilots latest developments and modifications in aircraft

Mobile Units Take Plane Training To Front Line Airfields

BY W. J. HARGEST, AMERICAN MACHINIST WAR CORRESPONDENT

Mock-ups used to show flying and ground crews how and why plane parts function. Combat knowledge added to instruction as units go from field to field

WITH THE AMERICAN AIR FORCE IN FRANCE—Among the hundreds of thousands of vehicles with our armed forces in France during August, one of them was unique unto itself. It was a 5-ton trailer truck packed with crates containing mock-ups of the engine and operating equipment for the P-47 fighter plane. It was a travelling school to keep *Thunderbolt* pilots and ground crews abreast of latest developments and modifications for this airplane, and to acquaint them with emergency procedures and trouble shooting developed out of combat experience by P-47 pilots operating from bases in Britain.

The trailer truck rolled to the edge of an advance fighter base, and beneath camouflage netting its crew unloaded the crates, set them up in a semi-circle, and unhinged the top, front and sides of each crate. These swung open as panels to reveal working models of the engine, engine accessories, plane operating and control equipment, and armament. Some of the mock-ups have cut-away prototypes to show how the parts function. Others are complete hook-ups of electrical, mechanical and hydraulic apparatus and instruments aboard the ship, all of which function exactly as they do aboard the aircraft.

While the mock-ups were being uncrated and arranged, the officer in charge of the mobile training unit and the commanding officer of the advance fighter base arranged a schedule for pilots and service mechanics to attend classes held under the direction of the Mobile Training Units crew composed

of specially trained enlisted men. Classroom schedules were prepared to fit time available, number of men needing training, and type of training.

With schedules prepared and mock-ups arranged conveniently to facilitate and speed instruction, including the use of the trailer itself as one classroom, classes commenced. All this was done within a few hours of the training unit's arrival.

Here in France close behind the retreating Germans, with thousands of Jerries still behind our advance forces and yet to be rounded up, the pilots and service mechanics of this P-47 fighter group were receiving the same instructions on *Thunderbolt* modifications and trouble shooting as were being given to personnel still being trained in the United States. Here education keeps pace with the lessons learned in combat. Here is education under the enemy's guns. Several such mobile training units will function with our air forces in France, Belgium, and perhaps in Germany itself.

Ten mobile training units were sent to the European Theater of Operations last March. Additional units have since arrived, making a total of approximately 38 units currently operating in the ETO. In England there are nine B-17 units, seven B-24 units, five P-47 units, five P-51 units, two P-38 units, one B-26 unit, one A-20 unit; in addition, there are two automatic pilot, one Sperry and one Minneapolis-Honeywell unit. Of this total, 28 operate with the Eighth Air Force and ten with the Ninth Air Force. While in this theater they are controlled by the Air Service Command, USSTAF (United States Strategic Air Forces in the European Theater of Operations), but receive their movement orders, housing, messing, and housekeeping functions from the using Air Force.

More than 100 MTU units are touring bases in combat theaters and in the United States. Practically every make of American aircraft is represented. Some of the units are built on contract by the aircraft companies and some by air force personnel. Actual working parts of the latest models of aircraft are cut away and mounted for instructional display. Practically all of the mock-ups are operative, enabling pilots and service mechanics to see at a glance just what takes place in a system or piece of equipment while an airplane is in flight. Batteries or generators are used to supply the motive power.

Much ingenuity and care has been shown in the creation of the mock-ups and they are constantly being changed by the MTU instructors as new equipment and techniques are developed. For example, if the manufacturer adds a new carburetor to the engines for a B-17, the flight engineer and ground crew must learn its operating principles and how to repair it; therefore, a mock-up is made of the carburetor installation, and incorporated in the equipment of the B-17 mobile training units.

The mock-ups are ideal training devices. In the hydraulic display, pilots and ground crew can see the action that steers the nose wheel, and why careful snubber servicing is important to prevent shimmying or failure when landing or taking off. They learn correct maintenance to insure safe and perfect operation of landing gear and cowl flaps, how brake efficiency depends upon proper clearances and perfect operation of de-boosters, and why sufficient air pressure must be maintained in the hydraulic accumulator and what happens if a leak develops and how to take care of it.

In the hydromatic propeller mock-up is a full size prop with blades clipped, and a cut-away view of the hub and governor. Oil supply is shown in transparent plastic tanks and pipelines. The instructor demonstrates how the hydraulic system functions to control propeller pitch during normal flight. And what is more important, he instructs pilots in the use of auxiliary equipment that feathers the propeller and prevents it from wind-milling when the engine is knocked out by enemy action.

Engine specialists among the ground crews can study another mock-up which shows the actual flow of fuel from transparent tanks through transparent pipes to the strainer, booster pump,

A British farmer is a spectator as this group listens to explanations as to the functioning of an instrument panel

firewall shut-off valve, engine driven pump, and finally into the carburetor.

On the electrical display panel are the switches and operating gages of the plane; also, the landing gear warning system, emergency alarm bell warning for bailing out, and electrical fire warnings of flames in an engine or compartment.

Another mock-up shows fire extinguishers in engines and compartments, wing and stabilizer units, and nose heaters. All displays have a threefold purpose; to teach equipment operating principles, to explain maintenance, and to emphasize repair short-cuts. For example, the armorer who has to align guns soon learns that there are short cuts to the job which bring the bomber more effective firepower.

One of the primary functions of the units is to combat accidents due to mechanical malfunctions. By teaching old crews the latest technical tricks, many accidents have been prevented, and many ships and their crews saved for action against the enemy.

An outstanding feature of all mobile training units is the flexibility of their instruction program. MTU's go beyond, and in a sense, excel the formal type of classroom instruction, since, save for preliminary lectures on new equipment, all work done by the students and instructors is practical. Theory is held to a minimum. Little time is lost on phases that are well understood, and emphasis is placed on solving particular problems, refresher instruction, short cuts and trouble shooting.

The units generally spend about two weeks at each base. Classes are set up in empty hangars, barns, on the line or at any convenient place. Schedules are planned so as not to interfere with combat missions. The schedules are always directed at the problems of the particular base. Much of the value of the MTU lies in the information picked up in its travels and passed on from base to base. If the mechanics at one Flying Fortress base have developed a short-cut solution for some malfunction, this knowledge is passed on by the MTU at the next B-17 base. As a result of the variety of experience gathered by instructors, many procedures for both operating and servicing techniques have been developed by the unit instructors themselves.

The complement of each MTU varies from six to 15 men according to the type of equipment carried. Each unit has an officer in charge who maintains the instructional program, handles arrangements for housing and messing and other necessities of the men, and takes care of reports and liaison with the base training officer. Some crews include civilian factory representatives who provide additional help in solving aircraft problems and instructing in latest modifications and short-cuts. Their mission is to provide the best training in the quickest time. They provide a tailored program of instruction impossible to give in fixed schools.

Functions of a B-17 chin turret are explained to a navigator by the MTU instructor. Each unit is assigned to a specific plane type and travels from base to base

There is a story behind the development of these mobile training units. During the vast expansion of our air forces after Pearl Harbor, the AAF Training Command trained hundreds of thousands of skilled pilots, bombardiers, navigators, gunners, flight engineers, airplane mechanics, radio operators and other specialists needed to fly our warplanes and to keep them flying. This job was accomplished at hundreds of flying fields and air force technical schools throughout the United States, and graduates were welded together by the domestic air forces and shipped overseas with combat groups.

These men were thoroughly capable of flying and servicing the planes in use at the time of their graduation but the constant and rapid rate of modifications and changes and improvements in our combat ships presented the problem: How to keep training in step with technical advances?

The problem became acute in 1942 when the new Lockheed P-38 was presenting operational and maintenance difficulties at the bases where they were being flown. Abortives and accident rates had become alarmingly high. The mobile training unit was the answer to this problem.

It was conceived at a conference in Los Angeles attended by Major General Walter R. Weaver, retired, formerly commanding general of the old AAF Technical Training Command, and Major General John F. Curry, former commanding general of the western division of the command, together with representatives of the Allison Engine Company and the Lock-

heed Aircraft Company. The training plan was jointly the brain child of Generals Weaver and Curry.

A set-up was initiated which included the use of Fruehauf trailer trucks as a standard unit. The mock-ups, and cut-aways of all the important functional parts of the plane were constructed and other instructional equipment, including schematic drawings, projectors for training films, charts, diagrams, complete files of technical orders and factory operational directives, were added. Faculties were assembled, consisting of handpicked top enlisted specialist instructors, seasoned graduates of factory and technical schools of the air forces, with an officer in charge.

The first mobile training unit, with mock-ups of P-38 Lightning equipment, began its travels on July 2, 1942. Operating at air bases where P-38 groups were being processed for overseas, it became immediately apparent that the solution to a critical training problem in the air forces had been found. Other units were constructed and equipped for the latest models of fighter, bomber and cargo planes. Requests poured in from bases all over the country for MTU's. Expansion was rapid as the units proved successful and popular.

Steps were then taken to design units capable of having its instructional equipment packed into cargo planes to be flown where needed with its staff of teachers. The first such units were sent to Air Transport Command bases in the then combat-active Aleutians. Later, other units were flown to Labrador, Newfoundland, Iceland, Africa, and Caribbean bases. Still later, when transportation facilities and time permitted, the instructional equipment was packed into the 5-ton trailers and shipped overseas to combat theaters where they could move from base to base. Today, these mobile training units are in use in every combat zone where American Air Forces operate.

Mobile training units are organized, constructed and operated by the Army Air Forces Training Command's western technical training division headquarters at Denver, Colo., and are presently under the command of Major General James E. Chaney with Lieutenant Colonel Thomas E. O'Connell as director of the program. The units remain under the control of the Denver headquarters whether operating within or without the continental limits of the United States. They are placed on temporary duty with the domestic and overseas air forces for a period not in excess of six months.

After six months duty with tactical air forces, the units are brought back to the United States for complete overhauling. Refresher courses for the instructors are given at factories.

After operating in one combat area the units are often sent to entirely different areas after the instructor personnel has been brought up to date and mock-ups and other teaching equipment is redesigned to represent the last word in modifications and change. The interchange of ideas between combat theaters accomplished by MTU's has proved invaluable in teaching maintenance and flight procedures.

In the shadow of a veteran bomber, a mobile training unit instructor schools a group of flight and line crew chiefs on latest procedures in servicing a "Fort's" oxygen system

AMERICAN MACHINIST REFERENCE BOOK SHEET

Standard Markings for Grinding Wheels—I

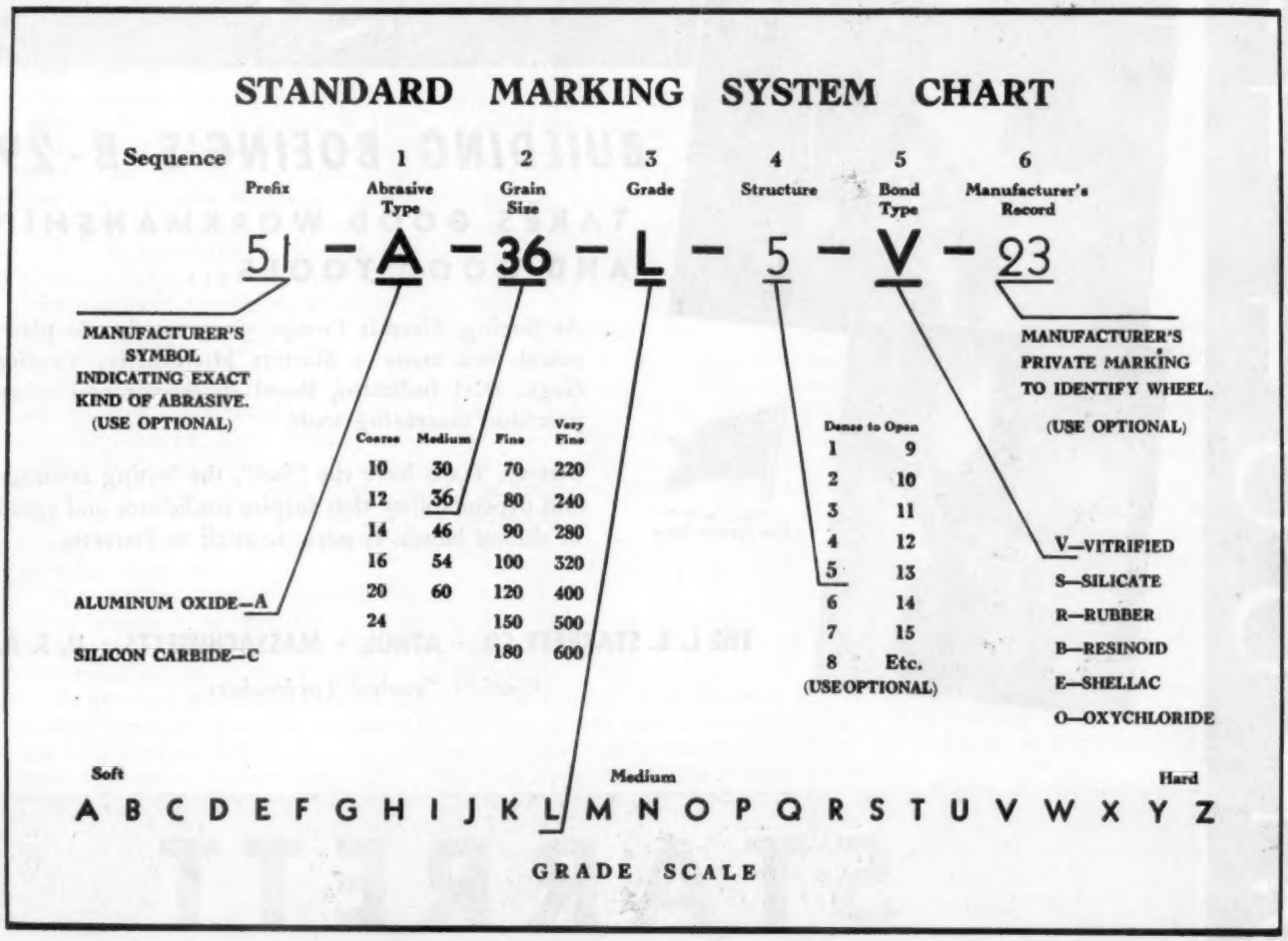
APPROVED BY THE GRINDING WHEEL MANUFACTURERS ASSOCIATION

FOREWORD

THE DESIRABILITY of a uniform system for marking grinding wheels has long been recognized by wheel manufacturer and consumer alike. Numerous attempts have been made in the past to devise such a system, but none were entirely satisfactory. On several occasions such systems have been given actual trials in selected groups of consumer plants. The last attempt showed promise. After a year's trial it was submitted and subsequently approved under American Standards Association procedure as an American Standard (B5.17—1943). However, the satisfactory reports from the limited number of plants in which it was tried proved to be premature because in extending its use to other plants reactions were brought out indicating shortcomings.

The committee of the Grinding Wheel Manufacturers Association, assigned to study the subject, is of the opinion that the principal reasons for the failure of the American Standard were that confusion still existed and nowhere in the standard itself was it clear that wheels similarly marked, if made by different manufacturers, would not grind alike.

However, the grinding wheel manufacturers are agreed that much good can be accomplished by use of a uniform system of markings, provided the limitations of the system are clearly understood. The Standard, submitted herewith, was prepared with this objective in mind, and is a *standard of markings only* and not of grinding action. The best points of the previous standard were retained, other features not satisfactory were revised. The most important revision was the adoption of



STARRETT TOOLS

Now, with Two Service Stars

BUILDING BOEING'S B-29

TAKES GOOD WORKMANSHIP AND GOOD TOOLS...

At Boeing Aircraft Company's great Seattle plant you'll find many a Starrett Micrometer, Vernier Gage, Dial Indicator, Bevel Protractor and other precision measuring tools.

Starrett Tools have the "feel", the lasting accuracy and dependability that inspire confidence and speed in skilled hands. It pays to stick to Starretts.

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Standard Markings for Grinding Wheels—II

APPROVED BY THE GRINDING WHEEL MANUFACTURERS ASSOCIATION

an alphabetical marking system, for all bond types, to designate grade of hardness. Better provision was made for the wheel maker to incorporate into the markings such special symbols as might be required properly to qualify the basic symbols of the standard markings.

The members of the Grinding Wheel Manufacturers Association have voted to adopt this system. The individual members will start putting it into effect as soon as expedient. Because of the magnitude of the task, months may be required to make the transition complete. During this period and perhaps for a considerable time thereafter wheels may be marked with both the new standard and the wheel maker's own marking. This is referred to in the Standard as Dual Marking. It is intended that the Dual System will eventually be abandoned and that the new Standard Marking alone will be found to be adequate.

This is submitted to all grinding wheel consumers as a Grinding Wheel Manufacturers Association standard.

Purpose and Scope

This standard applies to grinding wheels and other bonded abrasives: segments, bricks, sticks, hones, rubs, and other shapes, which are tools used to remove material, alter shape or size, produce a desired surface or accuracy of dimension, or a combination of these objectives.

The standard does not apply to diamond wheels or to specialties such as sharpening stones where radically different symbols are commonly used.

The Standard establishes a symbol for each of the most essential characteristics of a grinding wheel, and arranges these symbols in uniform sequence.

This is a standard system of markings only. Wheels bearing the same standard markings if made by different wheel manufacturers may not and probably will not produce the same grinding action. This desirable result cannot be accomplished because of the impossibility of correlating any measurable physical properties of bonded abrasive products in terms of their grinding action.

Sequence of Markings

Each marking will consist of six parts, placed in the following sequence:

1—Abrasive Type
2—Grain Size
3—Grade
4—Structure
5—Bond Type
6—Manufacturer's Record

1. ABRASIVE

Abrasives naturally fall into two distinct groups, namely the aluminum-oxide group and the silicon-carbide group. Letter symbols are used to identify these two groups, as follows:

A—Aluminum Oxide
C—Silicon Carbide

Where it is necessary to designate some particular type of these broad classes, the manufacturer may use his own symbol or brand designation as a prefix.

2. GRAIN SIZE

Grain size is indicated by a number.

The following list (from coarse to fine) includes all of the ordinary grain sizes commonly used in the manufacture of grinding wheels. It conforms with Simplified Practice Recommendation R118-40.

10, 12, 14, 16, 20, 24, 30, 36, 46, 54, 60, 70, 80, 90, 100, 120, 150, 180, 220

The following additional sizes are occasionally used: 240, 280, 320, 400, 500, 600.

If and where it is necessary to indicate a special grain combination, the wheel maker may use an additional symbol appended to the regular grain symbol.

3. GRADE

The grade is indicated by a letter of the alphabet, A to Z, soft to hard, in all bonds or processes.

4. STRUCTURE

The use of a structure symbol is optional. If and where it is advisable to indicate the structure in a wheel marking, a simple number symbol shall be used. Numbers from 1 to 15 will cover the range of structures being used today, but there is no reason why higher numbers cannot be used if necessary. Progressively higher numbers are used to indicate progressively wider grain spacing (sometimes called "more open" structure).

5. BOND OR PROCESS

The bond or process is designated by the following letters:

V—Vitrified
S—Silicate
E—Shellac or elastic
R—Rubber
B—Resinoid (Synthetic resins)
O—Oxychloride

6. MANUFACTURER'S RECORD

Manufacturer's records are designated by symbols. Each grinding wheel manufacturer is at liberty to use the sixth position for private factory records.

Dual Marking

Where the standard method of marking differs materially from the old form, it may be advisable to use both the old and the new markings during the introductory period, and perhaps for a considerable time thereafter. This would enable the user to become accustomed to the conversion gradually.

Where wheels are too small to permit the use of the complete marking, the grain and grade marking alone may be used on the wheel, or the marking on the wheel itself may be omitted entirely. Where this is done the complete marking (including the dual marking where necessary) shall be indicated on container labels.

Wheel Manufacturer's Name

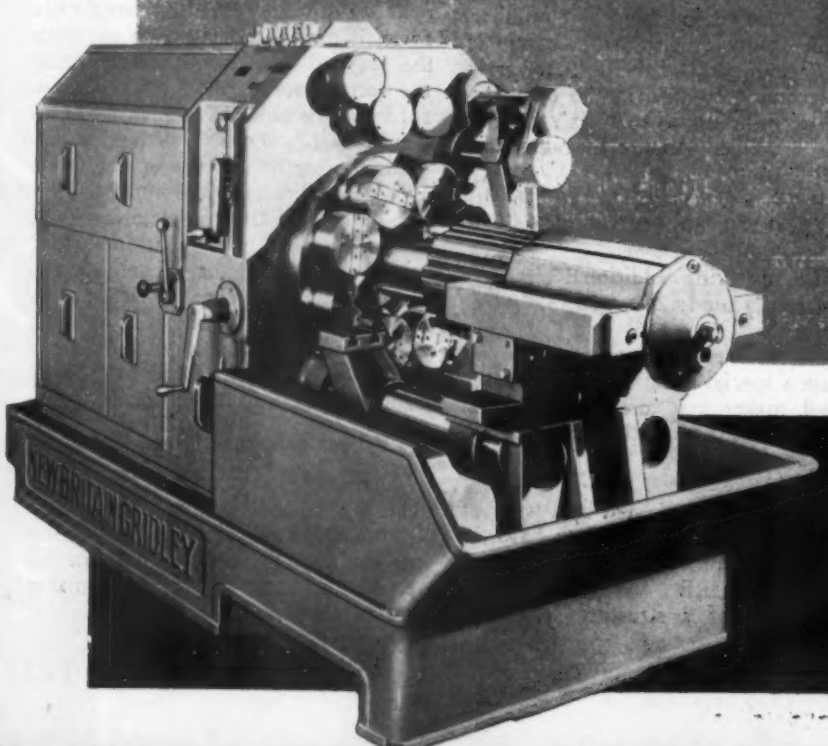
Due to the greater similarity in marking that will result in many cases from the use of this system, it is important that the user include in his records the name of the wheel maker as a part of the marking.

How to select.....
AN AUTOMATIC MACHINE
IN ONE EASY LESSON

Pick the one that will give you the lowest net cost per piece. Frankly that's all there is to it.

How to pick the right one? Stick to facts and figures. We will gladly give you full information about what New Britains could produce for you, in connection with present or future products. And we will stand or fall on what we can show you New Britains can do for you.

New Britains have always been sold on this basis by sticking everlastingly to that principle. They have become the leaders in their field.



ARMY E NAVY

NEW BRITAIN-GRIDLEY MACHINE DIVISION
THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT

Gaging Business

Cut-Backs Diminishing

The sound and fury over cut-backs is temporarily dying away, and there are several reasons advanced for this. The first is the sobering fact that the war in Europe will last longer than many people had expected, and this is tempering military plans for reductions in the munitions program. The second reason is that the rearrangement of the military production picture in the light of experiences in the European War has been largely completed for the time being. The third reason is the political importance of not disturbing employment any further until after the election.

However, one further cut is definitely in prospect—a 10 percent slash in the plane program by weight. September plane production in terms of weight amounted to 92,700,000 pounds or 7,598 planes. The new W-12 plane program presented in mid-October proposes cuts in certain types of fighters and in light and medium bombers, but its timing may be delayed until after Election Day. It is reported that 98 percent of present plane output consists of combat types.

Not Renewing Contracts

In place of cut-backs, war production will begin to feel the growing influence of contract run-outs early in 1945. Contracts in certain kinds of bomb-sights, training planes, and other items have already ended upon being filled without renewal. Thus, some observers feel that contract run-outs will be more of a problem than cut-backs.

Naval construction in the first quarter of 1945 will be down seven percent from the average rate for the 1944 second half, but will still be up three percent from the first half of 1944. This will contribute to the decline in steel plate requirements expected for the first quarter of 1945. As it is, steel orders for the current quarter are lagging behind allocations, and it is reported mills have open rolling capacity for December.

Flat Rolling Easier

The $20,000,000 cut in steel landing mats, announced early in October, also helps to ease the flat-rolled situation. This brightens the prospects for reconversion, which would demand sheet and strip steel. However, the fractional horsepower motor picture continues tight and this will hamper any move to resume production of washing machines and vacuum cleaners.

The Navy continues as an active purchaser of machine tools and other equipment for use at advanced naval bases, particularly the equipping of portable machine shops. Recent purchases include welding machines, bending rolls, and furnaces.

Lend-Lease Tools Back

To aid the heavy artillery program, some lend-lease tools were brought back here recently from Australia and Great Britain. This serves to highlight the continuing uncertainty over what will be done with lend-lease tools after the war. Under lend-lease, present users are privileged to send them back here only to intensify our own surplus problems. Moreover, if these tools were turned over to lend-lease nations at a low price, they could be exported in the foreign market in competition with American tool builders. Even if such sales were to stipulate that the lend-lease nation could not sell our tools on the foreign market, their availability of these tools would permit them to export a like number of other used tools of their own make or American-made tools purchased for cash.

British Lay Trade Plans

Some American exporters are excited over reports that the British government has made long-term purchases from various foreign nations of meat, cocoa, sisal, and other commodities. The British deal with Argentina covers a four-year term. What concerns business is that these deals, dubbed "State Buying," may set a pattern for postwar international trade. Certainly, if the British and other governments are prepared to arrange transactions involving entire national requirements of a specific commodity, then it would be almost impossible for a private company to enter the world market on its own and secure adequate treatment.

In the long run, this may force the United States government to embark on "State Buying" to protect our foreign trade. Eventually, all our commodity requirements might be purchased by the government and then offered for sale to private industry. And perhaps our exports might be handled in the same manner, including sales of manufactured items.

Would Cut Competition

This would eliminate competition among private concerns in the foreign market, since it probably would involve sale of specific quotas of certain products abroad, and then the quota would be distributed among members of a particular industry. For example, if a foreign government bought several hundred turret lathes through the State Department, then the government would have to distribute the business among all lathe builders, both the leaders in the field and the secondary producers. But foreign purchasers might protest the wide range in quality of the products sold under such a deal, and might demand first-rate lathes only, which might not be feasible on the basis of State transactions. In other words, it would mean that the poorest producer of a particular manufactured item might determine the foreign market prospects for any industry in all nations.

Accordingly, foreign experts believe that the plan might be necessary on commodities, but that it would not be workable on manufactured products.

Civilian Trucks Slow

Civilian truck production is still lagging due to lack of castings and tires. Chances are that only 80 percent of the 1945 schedule for some 123,000 trucks will be turned out. Yet, a new plan for 26,179 light-heavy and 6,425 heavy-heavy trucks has been authorized for the first half of 1945. Bottlenecks in the truck program are being eased slowly, and it is possible that production handicaps may be entirely eliminated by the year-end.

The announcement of Russia's purchase of nine hydro-electric turbine generators for its Dnieprostroi power plant outside of lend-lease terms is an indication to American industry that the Soviet is not seeking postwar equipment through lend-lease. The Russians are prepared to buy about $300,000,000 worth of new industrial equipment, and are reported to be seeking about $100,000,000 worth of good used equipment. Such purchases would be on both a cash and credit basis depending upon each item.

Aluminum Stock Revealed

The government sockpile of 500,000,000 pounds of aluminum is finally being reduced, although slowly. Production cuts have brought output below requirements, thus eating into the stockpile. However, for the present government controls over the metal are being retained, largely due to the heavy influence that government operated plants still have on the situation. Postwar demand for the metal is set at 600,000,000 pounds as against present capacity of 3,000,000,000 pounds.

Aluminum strip and small tubing are tight but foil is now easier. Some foil has been released to non-military users. Because scrap is such a drug on the market, controls over scrap buying and melting have been withdrawn. This enables foundries, wrought products mills and powder plants to purchase scrap.

Stress Need of Postwar Tool Engineering Resourcefulness

Reconversion must be with same speed, resourcefulness and adaptability that characterized preparation for wartime production, Tool Engineers are told

SYRACUSE, N. Y.—James Y. Scott, president of The National Machine Tool Builders Association and president of Van Norman Company, spoke on "Engineering for Peace" at the twelfth semi-annual membership meeting of the American Society of Tool Engineers, here, October 12 to 14. He urged members of the society to speed reconversion as rapidly as possible when war production ends in order to speed the production of peacetime products and help keep employment of production workers at a high level. Mr. Scott pointed out that the need for reconverting quickly will be just as important as was the rapid conversion of metal-working plants to war production when the war started. The need for ingenuity and resourcefulness on the part of the tool engineer will, according to Mr. Scott, be just as great as when old and obsolete equipment had to be adapted for making war products by building the required precision into the tools. At the start of reconversion, available machine tools will have to be adapted to operations for which they were never intended, just to make it possible to get production lines running. Then, as the machine tool builders are able to catch up with requirements of their customers, these converted general-purpose machines undoubtedly will be replaced with high production single-purpose units because of the pressure of competition.

Exposition With 1945 Meeting

Of much interest to the metal working industry was the announcement by Douglas D. Burnside, president of the American Society of Tool Engineers, that the society probably will sponsor a "Machine and Tool Progress Exposition" at the Cleveland Auditorium on March 19 to 22, 1945, in connection with its thirteenth annual meeting. Mr. Burnside also announced that the society is to assume control and publication of its official organ, *The Tool Engineer*, starting with the February, 1945, issue of that publication. Pittsburgh, according to Mr. Burnside, was selected by the Board of Directors for the next semi-annual Society meeting in October, 1945.

A number of important papers of particular interest to tool engineers were presented during the technical sessions held in connection with the semi-annual meeting. During a meeting devoted to a discussion of production control, W. E. Crotsley, International Business Machines Corp., told in detail how mechanical accounting equipment can be employed for effective production and manufacturing control. Also, S. E. Lenox, assistant superintendent of the tool division of the same organization, discussed the use of such equipment for tool control and follow-up. In another session, Otis E. Grant, eastern manager of the magnesium division of The Dow Chemical Company, Max Judnich, chief engineer of Brooks & Perkins, and Carl J. Wiberg, supervisor, special process division, Wright Aeronautical Corporation, discussed the fabrication and machining of magnesium. Mr. Grant covered in general terms the production and fabrication of magnesium, and showed a motion picture on this subject recently prepared by The Dow Chemical Company. Mr. Judnich read a paper prepared by E. Howard Perkins, managing partner of Brooks & Perkins, covering methods used in that plant for fabricating assemblies of magnesium sheets and stampings. Practices employed for hot-forming various shapes in heated dies, riveting and welding such assemblies were described. Current practices in machining magnesium, as done by Wright Aeronautical Corporation, were described by Mr. Wiberg.

Problems encountered when operating a branch plant in Canada, from production, personnel and management angles, were discussed during another session by R. Eric Crawford, editor of *Canadian Machinery*, William A. Dawson, chief inspector of the Otis-Fensom Elevator Company, E. N. Wearn, superintendent of The Canadian Acme Screw and Gear Company, and Edward Kennard, vice president and general manager of St. Catherines Steel Products, Ltd.

The technical sessions included an innovation in the form of a symposium on tool engineering education. Participants were Otto W. Winter, chairman of the society's national education and training committee; Dr. Mark Ellingston, president of Rochester Institute of Technology; William F. Paterson, director of Apprentice-Training Service for the War Manpower Commission; and E. M. Bertschi of Caterpillar Tractor Co.

Most Cleveland Manufacturers Ready for Peacetime Output

CLEVELAND—Analysis of reports from 285 Cleveland manufacturers gave the surprising conclusion that 80 percent of industry here require little or nothing in time, tools or engineering to resume peacetime output.

There are prominent exceptions, of course, but it is noteworthy that industries which are suppliers of other industry are heavily in the column of those which can turn promptly to civilian production, so far as mechanical problems are concerned.

Cleveland, center of the automobile parts industry, is already receiving inquiries from makers on prices, delivery dates and quantities.

In such items as valves and mechanisms, crankshafts, pistons and rings, batteries, frames, engine castings, the conversion period is estimated to be no more than two or three weeks after designs and specifications are received.

The automobile parts industry, an $86,000,000 business in the 1937 (last normal) census of manufacturers, comprises, with motor trucks, 9.6 percent of Cleveland's business—probably more since some portion of it gets classified in other ways, as castings, or nuts and bolts. Another 12.2 percent segment of the total area industry, machinery, tools and appliances, is estimated to require from a few days to a few weeks to complete conversion.

Iron and steel production, totaling 16 percent of the city's prewar industry, likewise has only a nominal conversion problem, probably the greatest being the shifting of Republic Steel's continuous mill from plate to sheet.

Iron and steel products, accounting for 12.7 percent of the prewar total, vary considerably. Stamped and enamel ware shops will require from a few days to a few weeks to shift from bomb parts to toys and auto parts. Small industries in this group, such as hardware, boilers, nails and structural steel, have no problem. Screw machine products and wood screws will require a brief period for retooling; forging will vary from a few days to a few weeks, depending on whether old dies are used.

Makers of electrical apparatus, particularly the builders of special controls and motors, will have a longer period of preparation for normal output, but lighting equipment manufacturers can resume quickly. This is 6.7 percent of the total area industry.

In the non-ferrous metal group, 4.4 percent, there is estimated to be no problem.

It is emphasized that these estimates of reconversion problems pertain only to mechanical aspects. Sales organization and distribution is a more difficult question.

Inside Detroit

Tools for the Early Bird

Several weeks ago the automotive industry asked for high priority ratings on their machine tool orders now in the hands of builders in order that delivery promises made by the builders might not be rendered meaningless by the appearance later of higher-rated civilian orders. This request Krug turned down cold.

Now, however, considerable credence is given the rumor that the WPB is considering a spectacular move to make machine tool delivery promises to reconverting industries really mean something. According to the story currently circulating in Detroit, the existing 25 percent allotment of machine tool production to civilian industry will now be set up on a first-come-first-served basis without regard to priority ratings. In other words, delivery promises, once given, will not be set aside in favor of higher-rated civilian orders received at a later date by the machine tool builder.

This will, in effect, remove ratings on all civilian production with the exception of a few items, and, at the same time, it will not interfere in any way with vital war production. The importance of such a move to industries with tremendous reconversion problems ahead of them would be very great. It would enable them to count on specific dates on which various machines would be available and would thus mean the staking down of a troublesome variable which otherwise could upset the whole delicate timing of reconversion.

Optimism Is Stubborn

September's flurry of optimism about an early victory in Europe has almost disappeared as manufacturers remind each other again that they still have "a war to win." However, while the spell hovered here like a freak warm day in January, misleading harbinger of an early spring, peacetime speculation budded again and the perennial dream of the $500 Ford car became once more a favorite topic of conversation.

Cheap Cars Seem Unlikely

Derided by the great majority of informed industrial opinion as a more fantastic pipe dream than ever before, the idea has persisted even in the face of high wage rates which show no promise of decline. Regarding wage rates, industry representatives point out, it must be remembered that their effect is greatest on the price of complex end products like automobiles, where labor boosts prices cumulatively at every step from iron mine and rubber plantation to final assembly line.

Can technological advances of the past few years compensate—and more than compensate—for this great increase in labor cost? Will the use of newly developed substitutes achieve unprecedented materials economies? For the most part, to date, the answer of the automotive industry to these and similar questions has been a direct and emphatic "No."

But Cheap Materials May Help

Other questions, however, remain unanswered by even so much as coherent conjecture. Will, for example, the presence of tremendous stockpiles of certain materials (like aluminum and certain types of steel) and their tremendously expanded production potential depress prices to prewar levels after controls are released in spite of increased wage rates? And, if there is any such tendency, will metal industries insist upon minimum price regulation, etc.? The fate of the inexpensive automobile may hang partly on answers to such questions.

And Technology May Aid

There are, in addition, some technological advances which will undoubtedly provide some downward scaling of manufacturing costs in the automotive industry. In the past few months alone, spectacular improvements, such as automatic cut-offs in electric machine tool motors, have been made, which will pare manpower requirements significantly; precision honing has been made far more economical; vibration from extenior sources has been successfully eliminated, increasing the efficiency of grinding machines, boring mills, Rockwell testers, etc.

Prices Below Prewar Level!

As for actual lowering of prices, on October first, one automotive supplier —Parker Rust Proof Company—announced price reductions to 17 percent *below prewar prices* on all important rust-proofing chemicals. Although that may not be taken as any clear indication of the trend within the industry, it proves that higher wage levels do not always mean higher prices.

One other reason advanced by representatives of the Ford Motor Company why no $500 car had been built in the past is dealer opposition to the idea. Dealers were not too enthusiastic about a car which would take just as much space, servicing and "guarantee" rigmarole as any other car and would yield a smaller profit. They feared, the competition such a car would offer to their second-hand trade.

However, in a recent informal survey conducted by AMERICAN MACHINIST and covering 38 of Ford's 50-odd dealers in the Detroit area, approximately 3 out of 5 favored such a car. Many of those in favor explained that their second-hand stocks were so depleted and cars on the road today were so worn out that any time within the next 3 to 5 years or more a $500 car could be introduced without seriously affecting that branch of their business. Furthermore, many believe that the public has been waiting for such a car for years. Those not in favor claim just the opposite—that the public wants quality and to hell with economy.

Anodizing Racks—Adjustable racks designed and used in the finishing and plating department, The Glenn L. Martin Co., save electric current, permit greater use of anodizing tanks, have an almost indefinite life and are easy to clean

DOMINION TO MAKE BEARINGS

OTTAWA—As a result of war experience, Canada is to have its own bearings industry after the war. Up to now all bearings have been imported, largely from the U.S. or Great Britain. McKinnon Industries Limited, General Motors Canadian subsidiary may build a $2,600,000 ball bearing plant, while Timken Roller Bearing is said to have selected a new plant site.

Design and Production Interest SAE National Aeronautic Meeting

LOS ANGELES—Design of the super-airplanes that will be used in postwar air transport claimed the greatest amount of interest during the Society of Automotive Engineers' 1944 Aeronautic and Aircraft Engineering meeting held at the Biltmore Hotel here, on October 5 to 7. Attendance was approximately 2,000, mostly from the local aircraft manufacturing companies.

An indication that the aircraft engineers are thinking principally about the problems of designing large craft, cargo and passenger carriers, was the amount of discussion aroused by the following papers:

"The Design of the DC-4 Airplane," by E. F. Burton and Carlos Wood, Douglas Aircraft Co., Inc.; "New Concepts of Airline Aircraft Maintenance," by R. C. Stunkel, Lockheed Aircraft Corporation; "Research and Tomorrow's Aircraft Undercarriage," by R. W. Brown, Firestone Tire and Rubber Co., and "Fitting People Inside a Machine," by Henry Dreyfuss, industrial designer.

Luxury or Quantity?

All participants in discussion agreed that tomorrow's transport airplane must be satifactory equally on each of the four factors of safety, speed, comfort and cost, but marked divergencies of opinion developed as to the relative weight to be accorded each of these factors in future aircraft. Dreyfuss, for example, visualized large airplanes, for de luxe travel, in which private rooms and suites, as well as dining rooms, card rooms, lounges and passageways would be provided. Many in attendance differed sharply, pointing out that an airplane trip is a speedy trip, and that the goal of the designer should be to haul the maximum number of persons so that cost might be cut materially, even lower than the cost of minimum railroad or bus travel.

Little Cheaper by Mass Output

Designing for lower cost both of manufacturing and of operation crept in as a theme in most papers, in both production and design subjects. Easier maintenance, better interchangeability of parts, and the application of war-developed flying instruments to peacetime flying, were stressed as important in the development of aircraft capable of delivering many more hours of service, per day, than today's machine. Speaking on "Application of High Production Methods to Reduced Production," J. N. Foster, Curtiss-Wright Corporation, held out little hope to the industry for the possibility of any large volume-low cost airplane, insofar as manufacturing costs and consequent low first cost is concerned. Foster does not expect the aircraft industry to duplicate the low-cost record of the automobile industry.

Manufacturing costs of the small, private postwar plane were discussed by A. G. Tsongas and F. S. Macomber, Stinson Division, Consolidated Vultee Aircraft Corporation. Pointing out that the market for private planes will depend primarily on costs, they showed how a dollar saved in direct cost would make possible a two-dollar reduction in selling price, and suggested that designing and production engineers become more cost-conscious. Discussing the experience of his company in developing the "Ercoupe," Fred Weick, Engineering and Research Corporation, indicated the effect that simplicity and ease of handling might have in enlarging the postwar market for small private planes, pointing out that average students can learn to fly an "Ercoupe" in from three to five hours.

The Manly Memorial medal was presented to John Otto Almen, General Motors Research Laboratories, Detroit, for his paper, "Shot Blasting to Increase Fatigue Resistance," which was read in June, 1943, at an SAE meeting in Detroit. Basing his case on numerous tests, Almen advocated shot blasting of engine parts to put them in a compressive state so as to avoid failure of such parts under tension.

Service-Industry Conference Plans Bearings Reclamation

NEW BRITAIN, CONN.—That the success of bearings in military aircraft is dependent upon design as related to application, and secondly, upon the care and maintenance during operation, was brought out during the week-long bearing forum, at the Fafnir Bearing Co., here, between technicians of the Army Air Corps and heads of the nation's ball and roller bearing industry.

Headed by Lt. K. M. Glaesner, bearing technicians from the 12 Air Technical Service Command, AAC depots spread across the country, gathered here with bearing specialists of the industry to devise ways and means of conserving bearings for future use in rebuilt planes after they have been removed from dismantled aircraft. It was pointed out that such a conservation program would be tantamount to increasing important bearing production by thousands of units daily.

Divided into lectures, open discussions and plant inspections, the forum was planned to cover every phase of the manufacture and maintenance of anti-friction bearings, with special emphasis on the care and conservation of those to be reused in rebuilt military aircraft. It marks the first time that any of America's fighting services have joined with experts of the industry to pool their knowledge and resources in the conservation of war-important items.

In attendance at the symposium were experts from Fafnir Bearing Co., which acted as host, Hoover Ball and Bearing Co., Marlin-Rockwell Corp., New Departure Division, Timken Roller Bearing Co., SKF Industries, Hyatt Bearing Division and Roller Bearing Company of America.

Press Asm.

Engineers Consult—First Lt. K. M. Glaesner, Army Technical Service Command, and D. L. Holbrook, chief, aircraft bearing division, Fafnir Bearing Co., examine a bearing unit tested for load capacity by the device in the background. They were among AAF and industry representatives, at a week-long technical symposium in New Britain, Conn. to discuss bearing conservation

NTDMA Elects Officers

CLEVELAND—Richard F. Moore, president, Moore Special Tool Co., was elected president of the National Tool and Die Manufacturers Association at its first annual convention, here. Mr. Moore succeeds L. A. Sommer, president, The Sommer and Adams Co.

Richard F. Moore

Other officers elected are: vice president, Willis G. Ehrhardt, president, Ehrhardt Tool & Machine Co.; treasurer, H. F. Jahn, president, The B. Jahn Manufacturing Co.; and, secretary, Ben Buerk, president, Buerk Tool Works.

Wartime Washington

To Ease Controls Gradually

Although the War Production Board has had its V-E Day plans ready since October 1, this program is being polished pending the end of the European War. From time to time, parts of the plan will be put into effect, so that the longer the war lasts, the more controls will be removed.

The lifting of controls would be accompanied by a "run-out period" of about 90 days. If the war in Europe should end in the early part of a month, then the "run-out period" would be for three months including the peace month, whereas if the war ended late in a month, then the run-out would extend over the following three months. This period would leave order relationships on the books of industry in the same status quo as that dictated by priorities on V-E Day. The purpose of this is to minimize confusion over orders on the part of buyers and sellers.

It now appears that munition contracts will be cut 32 percent on V-E Day, with another eight percent cut due within the following 90 days. However, industry's ability to reconvert will in large measure depend upon the judgment of the contracting officer with whom each plant deals. For example, a manufacturer producing 1,000 pieces of artillery over ten months might have his output reduced to 60 pieces a month for ten months, or else might be asked to maintain the 100-per-month production rate for six months to wind up the reduced contract. Military requirements would influence such decisions.

In the long run, this means that war contractors will not be automatically free to reconvert a fixed percentage of their facilities on V-E day. This is a vital consideration which has not been emphasized by WPB announcements.

Spots Are Scarce But May Rise

While WPB insists that it will broaden its "spot authorization plan," only the manufacture of about $26,000,000 worth of civilian products has been permitted thus far. Biggest obstacle to more authorizations continues to be the manpower shortage. Latest War Manpower Commission estimate continues at 200,000 men short, but WMC insists that the the nature of the shortage in areas and skills involved is constantly changing. This means that "spot authorizations" will continue to be denied on the grounds of manpower shortages.

However, it is reported that WPB is seriouly considering a program for 1,000,000 refrigerators on an annual basis. The reason for the favorable chances of this program is that hospitals, drug stores, and other essential civilian users need replacements which are not available. What makes this situation serious is that blood plasma and important medicines and chemicals requiring refrigeration would go to waste unless stored in properly working units. Yet, the government's stockpile of refrigerators is almost gone.

The refrigerator program would allocate quotas to various established producers in a similar manner to the electric iron' program, but military officials are reported to be opposed to the quota plan. One thing that will hamper the program will be temperature-controls, which may prove to be a tough bottleneck.

Expendable—Disposal officials worry over public reaction when such specialized munitions-producing tools as the fuze gage, top left, for which $283 was paid is disposed of at scrap value of 30c; or the fuze gage top right, originally $189, is also sol as scrap; or the special forming en mill cutter, lower left, purchased for $8, is sold as scrap for 5c; or the circular form cutter, lower right, drops from $80 of cost to 25c as scrap. These tools were the means of achieving stupendous mass production and cutting cost by millions of dollars. But they are useless for peacetime purposes

To Survey Tool Manpower

Since the machine tool industry lacks 5,000 men, Chairman Krug of WPB has asked the Tools Division to prepare detailed data concerning this shortage. When this material is ready, Krug will personally take up the issue with the War Manpower Commission.

In order to try to help the automobile and other industries to secure reasonable deliveries on machine tools required in reconversion, WPB may amend the E-1-b Order, which set aside 25 percent of machine tool production for non-military requirements, including lend-lease, the railroad industry and other essential civilian groups. The amendment would remove ratings from this 25 percent group, which would place reconversion tool orders on an equal basis with other non-military business. At the same time, it would prevent military orders from competing with reconversion tool orders for early delivery.

Folding WPB Divisions

Elimination of the Redistribution Division (slated for October 31st, after postponement from October 15th) marks a turning point in surplus equipment sales. This Division's field staff aided in stimulating sales of used equipment by bringing buyers together with sellers. This staff kept track of sales and inventories of 6,500 used equipment dealers, aided in diverting items to the most essential users, and often helped the military secure badly needed items in emergencies. Yet, about 85 percent of the $199,000,464 sales recorded by the Division's field staff from May 1, 1943 to September 1, 1944, consisted of privately-owned equipment.

Abolition of this field staff several weeks ago has ended its reports on used items handled by tool dealers. Instead, government agencies will probably concentrate on data of government-owned surpluses and try to push sales of these items, rather than concerning themselves with privately-owned items. Meanwhile, the Army is reported to have objected to the ending of this reporting job.

Besides the Redistribution Division, WPB's Conservation Division, the Controlled Materials Plan Division, and the Production Controls Bureau are also being done away with.

Visits to some buildings which housed numerous WPB Divisions reveal vacant wings to buildings, piled up furniture, and empty desks. The Aluminum and Magnesium Division has shrunk to about 100 employees from some 325. Only a staff of 4 is now working on magnesium.

Appeals to the Construction Machinery Division for aid now seem to be largely concentrated on castings and forgings. The heavy items needed by manufacturers of construction machinery are in particularly critical supply. It is reported that about 2,000 tractors of the Cleveland Tractor Company are down in the field due to lack of replacement parts for their engines. As a result, a replacement part program for this company may be set up.

Spotting the Air News

Will Ask Variable Pitch Props

Development of variable pitch propellers for light airplanes has been pushed so far by the armed air forces that the industry now is up against the problem of giving this added efficiency to personal aircraft for early postwar distribution. If 400,000 light planes are sold in the next four to eight years, an estimate endorsed by trustworthy authorities, something like a million and a half propellers will be produced for them. Light propeller builders figure that each plane calls for about four airscrews as spares and replacements.

It is the hubs of lightplane propellers alone that are of interest to the metal-working industry. At present, nearly all small props have laminated wood blades. The steel hubs require close tolerances and fine finishing, mostly by standard machine tools, partly by special tools. A score or more of the 85 makers listed in *Aviation* magazine's directory are making or planning light-plane propellers.

Three Lead the Field

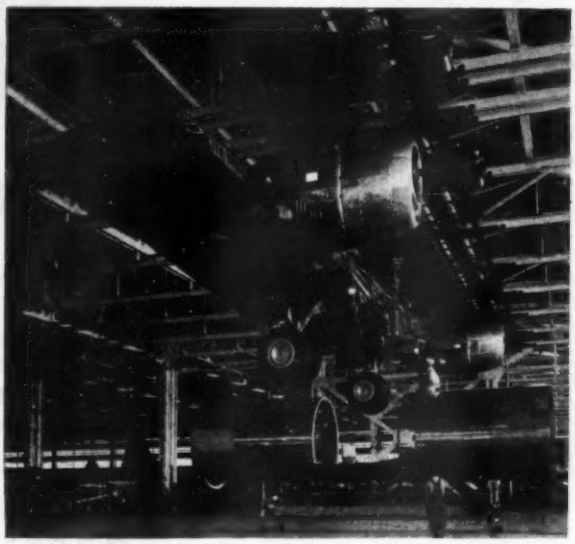
Only three companies, so far as reported, are yet in production of variable pitch propellers for light airplanes. They are Bartlett Hayward, a subsidiary of the Koppers Company; Diamoloy Tool Company; and Beech Aircraft. Bartlett Hayward is delivering a fully automatic hub to the Army and Navy for trainers, liaison planes, and general utility planes. Diamoloy has just received a large order from the Army and is tooling up for transition from initial to volume production. Beech, which took over a design known as Roby, has delivered some hubs to a liaison aircraft producer, to be tried out for the Army.

The old fashioned fixed pitch propeller is set for efficiency at cruising speed at some arbitrary altitude. It is at maximum efficiency at no other speed or altitude. For the takeoff, for the climb, and for laboring with heavy load, the pitch of an airplane's propeller should be in "low." The angle of pitch to the plane of rotation is small, so that the prop takes a thin bight of air. It is the same thing as putting a car in low gear. For cruising, at various speeds, at various altitudes, with various loads, under various weather and engine heat conditions, the angle should be at varying wider angles, to take wider bights. The highest "high" pitch is needed for the descnding glide under power, except for power diving, which should not interest Sunday flyers.

Private Planes Prime

Propeller efficiency will be important in the postwar personal airplane, whose manufacturers will strive for fuel economy, and ability to perform in restricted fields. Things they will not want are: high weight, high cost, and complications requiring expert attention in operation and maintenance. Therefore, designers are trying to get completely automatic, constantly variable, pitch control, without electromagnets, without hydraulics, and without anything in the cockpit for the pilot to adjust. Bartlett Hayward has got just that: a hub that changes its own pitch a split degree for every slight change of the airplane's attitude. It is always delicately balanced at maximum efficiency on the components of several aerodynamic and centrifugal forces acting on the blades and on a pair of counterweights, as a result of rotation. Principles are ingeniously adapted, and the mechanism is simple and reliable. At present a unit absorbing 100 to 150 hp. weighs about 40 lb. and costs about $300.

Diamoloy's Annesley propeller has only two positions—low and high, selectable by the pilot through a push-pull cable to the cockpit. Its range of efficiency is limited, but it weighs no more than the ordinary fixed pitch hub, and costs only about $100 as compared with $50 or so for the fixed pitch job. Aerodynamic forces acting on the blades tend to push them into low pitch, while counterweights tend to push them into high. There is a slight difference between these two forces, which is all the pilot has to pull when he works his control. Scores of devices have been tried to achieve variable pitch; scores more repose in the patent office. The two just described probably will dominate the field for a while.



Maiden Flight — The 17-ton main center wing section of a Boeing B-29 Superfortress travels by two 10-ton cranes to join the fuselage bomb bay section at that company's Wichita plant. It is necessary to jack up the center of the bomb bay section to allow a quarter of an inch tolerance "spread" as the two nestle together. Removal of the jacks takes up the slack

Expectation-Exceeding Attendance Hear Postwar Electronics Discussed

CHICAGO—A keen, industry-wide interest in postwar plans and products was evinced by the 2,100 topflight executives in attendance at the first National Electronics Conference, here, October 5 to 7. The attendance was predominantly of technical and production men, many of them seeking products for postwar manufacture by their war-swollen plants.

The conference was sponsored by the Illinois Institute of Technology, Northwestern University, the Chicago Section of the Institute of Radio Engineers and the Chicago Section of the American Institute of Electrical Engineers with the cooperation of the Technical Societies Council.

Dr. C. S. Roys, Illinois Institute of Technology, read a paper devoted to a general survey of the more important electronic devices encountered in industrial applications. He emphasized the particular characteristics of each tube, both vacuum and gaseous types, and described the better-known characteristics of each.

R. M. Serota, Allis-Chalmers Manufacturing Co., devoted a paper to "Typical Industrial Electronic Applications." He discussed counters, frequency rate and speed indicators, turbidity and density meters, shock measurements and thermal indicators and

alarms. In the field of control applications he treated of current, voltage, frequency and speed regulators for motors and generators, electronic timers, limit switches and safety devices.

During the session on electronic measurements and controls, Theodore A. Cohen, vice president, engineering and research, Wheelco Instruments Co., read a paper, "Electronic Mechanism Development for Process Plant and Laboratory." His paper stated that electronic mechanisms have often presented simpler, more effective solutions of automatic control problems.

At the same session, H. D. Middel, General Electric Co., told of the contributions made by electronics in the field of process instrumentation. Electronics will augment, rather than displace to any great extent, other mature forms of measurement and control.

Dr. F. A. Firestone, University of Michigan, devoted a paper to "The Supersonic Reflectoscope, an Instrument for Inspecting the Interior of Metal Parts by Means of Sound Waves." This instrument detects interior flaws, measures metal thickness and indicates discontinuities of plated or soldered surfaces.

Discuss High-Frequency Heating

"High Frequency Heating of Conductors and Non-Conductors," was the subject of the paper by C. J. Madsen and R. M. Baker, Westinghouse Electric & Mfg. Co. The theoretical concepts of the phenomena of heating conducting and non-conducting materials were presented in some detail.

Radio frequencies make possible the application of power to metal objects in concentrations up to 100 kw. per sq. in., and may amount to 20,000 kw. per cu. in. under favorable conditions, stated Dr. Wesley Roberts, Radio Corporation of America, in a paper read during the high freqeuncy heating session.

"New Methods and Techniques in High Frequency Heating," was the subject of Dr. Eugene Mittleman, Illinois Tool Works. He stated that increased efficiency and greater effectiveness can be obtained by designing generators capable of delivering a constant rated power to a varyir load, by appropriate impedance matching methods.

Regulation and Testing Considered

During the session on industrial applications, J. M. Cage, Allis-Chalmers Mfg. Co., in a paper, "Negative Feedback Amplifier Theory Applied to Regulators," outlined the possibilities of applying amplified concepts to regulators.

Dr. H. O. Fehr, General Electric Co., devoted himself to "Some Applications of Electronic Equipment for Material and Design Testing." His paper presented the various electronic and recording equipments which can be used with wire strain gages for the measurements of dynamic strains.

Names in the News

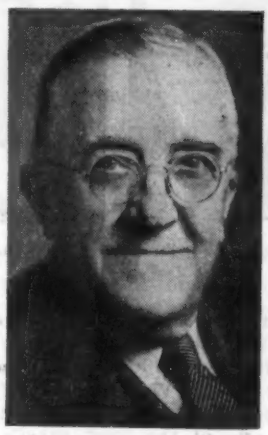
A. J. M. Baker

C. R. Tyson

Charles Roebling Tyson has been elected president of the John A. Roebling's Sons Co., Trenton, N. J., to succeed the late **William A. Anderson,** who died last month. At the same time, **Lt. Joseph M. Roebling,** now serving abroad with the United States Army Air Corps, was elected chairman of the board. Lt. Roebling, who has been first vice president of the company since 1936, was president of the firm from 1926-1936.

A. J. M. Baker has been elected director and vice president of the E. W. Bliss Co., Brooklyn, N. Y. He was the former general manager of the Crocker-Wheeler Electric Mfg. Co., Ampere, N. J., a division of Joshua Hendy Iron Works, Sunnyvale, Calif. Mr. Baker was assistant vice president of the latter company and previously he was deputy director of the British Purchasing Commission.

Fred H. Colvin, editor emeritus, AMERICAN MACHINIST, will be presented with a degree in Mechanical Engineering, Honoris Causa, by the Stevens Institute of Technology, for his



Fred H. Colvin

distinguished services to the engineering profession. The presentation will be made at commencement exercises on October 28, 1944.

L. E. Cooney

Ellis L. Spray

Laurence E. Cooney has been appointed vice president and general sales manager of the Austin Co., Cleveland, Ohio. Mr. Cooney has been associated with the company for more than 25 years and, most recently, in the capacity of district sales manager.

Ellis L. Spray, assistant to the president in charge of the Headquarters Manufacturing Div. of Westinghouse Electric & Mfg. Co., has also been elected vice president and general manager of the Westinghouse Electric Elevator Co. Mr. Spray's election followed the retirement of **Frank C. Reed,** president of the elevator company since 1936 and vice president of the parent company, since 1942. **George H. Bucher,** president of the parent company, was recently elected president of the elevator company to succeed Mr. Reed.

David Sussin

Lester C. Stork

Lester C. Stork has been named vice president in charge of manufacturing and engineering, and **David Sussin** has been appointed chief of research for the Kelley-Koett Manufacturing Co., Covington, Ky. Mr. Stork was formerly factory manager, while Mr. Sussin previously was chief engineer of the firm.

T. L. Knecht, former factory manager of Borg & Beck, a Chicago division of Borg-Warner, has been appointed vice president and general manager of Borg & Beck. **J. T. Branit** will succeed Mr. Knecht as factory manager.

Carl Bergstrom

H. B. Lewis

Herbert B. Lewis has joined Lukens Steel Co. and divisions, By-Products Steel Corp. and Lukenweld, Inc., as manager of the machinery division. Mr. Lewis has been with Brown & Sharpe Manufacturing Co., Providence, R. I., for the past 25 years where he served as manager of two manufacturing divisions of the company at different times and was in charge of the experimental department for several years.

Carl A. Bergstrom, former treasurer and general manager of the Weldon Tool Co., Cleveland, Ohio, has been named president of the firm to succeed **A. L. Lundstedt,** who is now chairman of the board. **Paul E. Lees,** former assistant secretary, and **J. H. Devlin,** former sales manager, have been elected vice presidents.

J. K. Thompson has been named assistant manager of the Gary, Ind., plant of the American Bridge Co., U.S. Steel subsidiary. In the 43 years that Mr. Thompson has been associated with the company, he has located in the company's plants in Trenton, N. J., Ambridge, Pa. and Elmira, N. Y.

William W. Greenway has been appointed production engineer for Mt. Vernon Car Manufacturing Co. and J. P. Devine Manufacturing Co., Divisions of H. K. Porter Co. of Pittsburgh, Pa. Mr. Greenway was previously associated with the Austin Western Co. as production specialist.

Philip S. Hill, former assistant manager of the Hyster Eastern Div. at Peoria, Ill., has returned to the Portland, Ore. office as general sales manager. Mr. Hill, who has been with the company for 11 years, was previously manager of the Hyster Washington, D. C. office. At the same time, **Glen M. Ede** was named assistant manager of the Hyster Industrial Truck Div., after eight years as general purchasing agent for the company.

Charles H. Slaughter has been named national sales manager for Thomas Machine Manufacturing Co., Pittsburgh, Pa. Mr. Slaughter has been active in the machinery and metal industries for some years and has been associated with numerous companies in the field.

Clifford M. Sorensen, former president of the Continental Die Casting Corp. which was purchased last December by the F. L. Jacobs Co., Detroit, Mich. has been elected a vice president of the latter company.

BUSINESS ITEMS

The **DoAll Trade School** has moved from its former location in Minneapolis, Minn. to new and larger quarters at 254 No. Laurel Ave., Des Plaines, Ill.

Empire Tool Co., Detroit, Mich., has been named exclusive distributor of the Rigid Live Center, manufactured by **Aeronautical Products, Inc.,** Detroit and Washington Court House, Ohio.

Harry M. Dunn with offices in the Universal Terminal Warehouse, 1006 Washington Ave., Houston, Tex., has been appointed sales and service representative for **Eclipse Counterbore Co.,** Detroit, Mich. in the South Tex. territory.

H. K. Porter Co., Inc. of Pittsburgh, Pa. and subsidiaries has opened offices at 849 Petroleum Bldg., Los Angeles 15, Calif. **Harold A. Hintz** has been appointed district manager for the territory with headquarters in the Los Angeles office.

OBITUARIES

Carl Yoder

Philip Bannan

Philip L. Bannan, Sr. passed away at his home in San Francisco on Oct. 7. Mr. Bannan organized the Pacific Gear & Tool Works in San Francisco in the early part of this century and was one of the west coast's pioneer gear manufacturers.

Carl M. Yoder, 59, president of the Yoder Co., Cleveland, passed away Sept. 28. He worked for various engineering firms in Salem, Alliance and Cleveland before he formed the Yoder Co. about 3 years ago. Mr. Yoder retained his position as president of the firm until his death.

Earl L. Myers, 52, general superintendent of the Gisholt Machine Co., Madison, Wis., died there on Sept. 20. Mr. Myers has been associated with the Gisholt Co. for 16 years and prior to that time he was affiliated with the LeBlond Machine Tool Co. in Cincinnati.

William H. Shepard, 86, died early this month in Cleveland. Mr. Shepard was one of the founders of the Crucible Steel Castings Co. and was also connected with T. H. Brooks & Co., a structural steel concern.

Walter C. Greist, 70, vice president of the Greist Mfg. Co., New Haven, Conn., passed away on Sept. 19. Mr. Greist has been connected with the machine company since 1895.

Ray A. Hauserman, 54, vice president in charge of plant operations of the E. F. Hauserman Co., Cleveland, died suddenly Oct. 1. Mr. Hauserman recently celebrated his quarter of a century association with the firm and has served as an officer for the past 20 years.

MEETINGS

American Machine Tool Distributors' Association. Fall meeting. The Homestead. Hot Springs, Va. Nov. 13-14.

American Society of Mechanical Engineers. Annual meeting. Pennsylvania Hotel. New York, N. Y. Nov. 27-Dec. 1.

International Business Conference. Claridge Hotel. Atlantic Cty, N. J. Nov. 10-18.

National Association of Manufacturers. Reconversion Congress of American Industry. Waldorf-Astoria Hotel. New York, N. Y. Dec. 6-8.

National Exposition of Power and Mechanical Engineering. Madison Square Garden. New York. Nov. 27-Dec. 2.

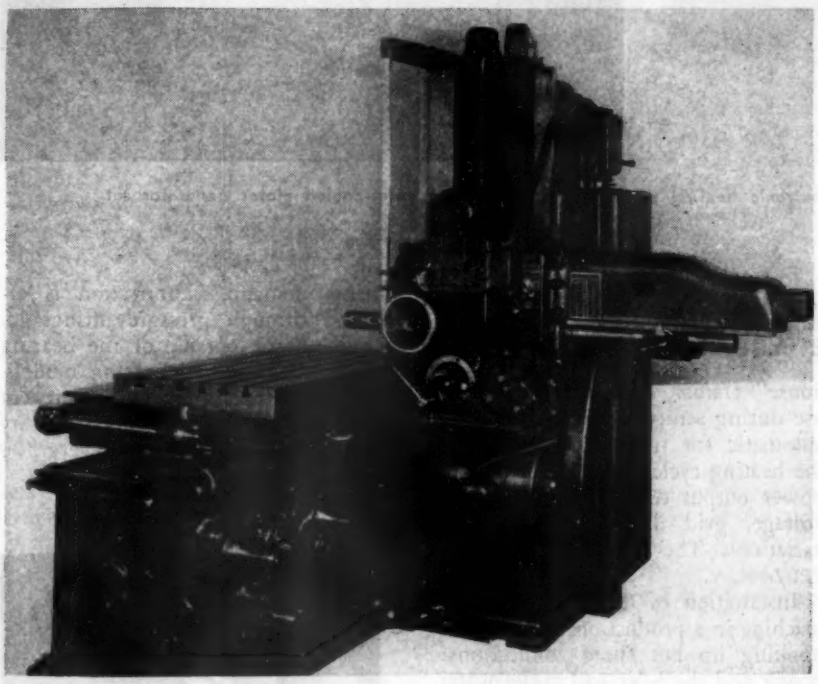
Society of Automotive Engineers. National Fuels & Lubricants Meeting. Hotel Mayo. Tulsa, Okla. Nov. 9-10.

Society of Automotive Engineers. National Air Cargo Meeting. Hotel Knickerbocker. Chicago, Ill. Dec. 4-6.

Society of the Plastic Industry. Fall Meeting. Waldorf-Astoria Hotel. New York. Nov. 13-14.

Shop Equipment News

DeVlieg Machine Company New Model Jigmil Builds Skill Into Automatic Features, Lowers Operator Requirement



DeVlieg Model 3-B Jigmil

The DeVlieg Machine Co., Ferndale, Mich., announces a new Model 3 in. bar Jigmil, the 3-B. This model is a refinement and enlargement of the 3-A. A feature of the new model is automatic power positioning of the spindle from location to location, with 0.0001 in. accuracy, in response to precision end measuring rods and push buttons.

New feather-touch control pressure locking of the slides relieves the operator of giving this his special attion to get high accuracy.

Retraction of the table and work from the cutting position is in response to push buttons, and cycles automatically, thereafter, through unlocking, retraction the desired distance, return, stopping and locking accurately in cutting position to within 0.002 in.

Five motors handle, respectively, spindle head drive, power rapid traverse movement to the head and table, power feed to the head and table, automatic retraction, repositioning and locking and power rapid traverse to the bar.

The machine has 24 spindle speeds from 22 to 1,200 r.p.m., bar feeds in thousandths per revolution from 0.001 to 0.016 in. and dial quick change feeds from 0.3 to 15 in. per min.

A special control panel coordinates and controls all functions, using standard controls and no electronics. Finger tip control renders all movements of the machine operative from one position.

Specifications include: table, 30 × 48 in., range dimensions of travel, horizontal movement, 48 in., vertical movement, 37 in. from 1 in. with the center line of the spindle to 12 in. below to 36 in. above top of table; bar movement, 16 in., provided with an extra means for resetting six additional inches; retraction movement on table, 16 in.

The machine is equipped throughout with anti-friction bearings and automatic lubrication, with all motor mountings accessible. It is arranged for 220, 440 or 550 v., a.c., 3 phase, 60 cycle.

All the slides have been increased in length and width. Bearing areas have been increased in a measure required to serve a greatly increased dependable accuracy.

Rieger Multifacer Has Wide Variety of Applications

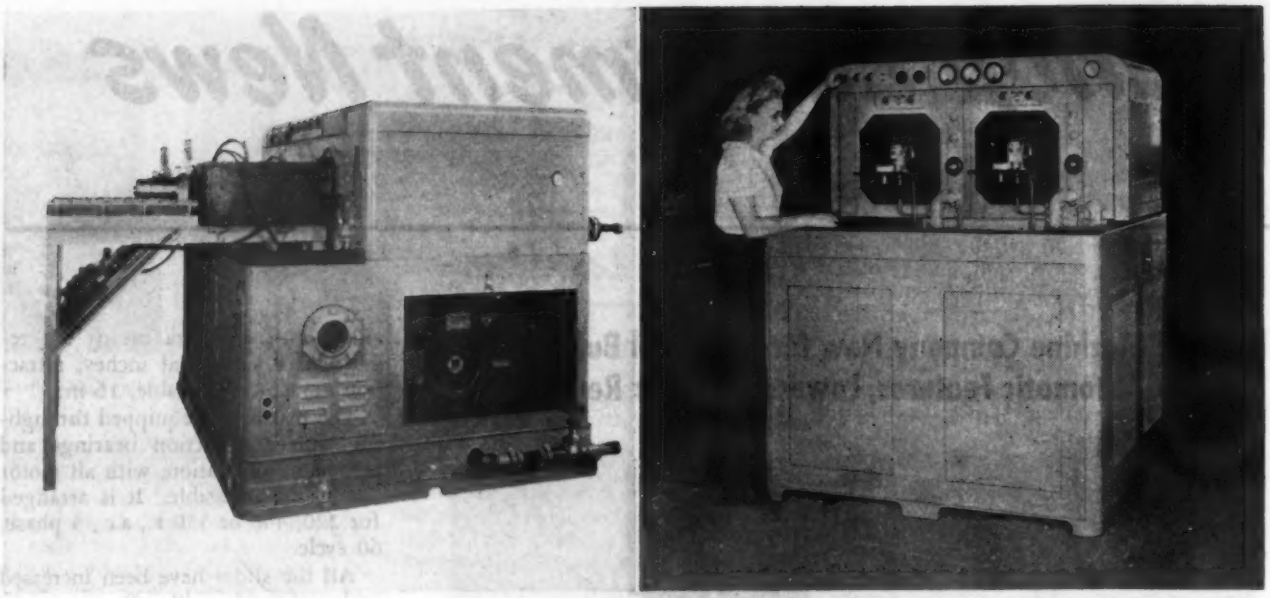
The Multifacer, a new tool being introduced by The Rieger Mfg. Co., Dept. AM-10, Miamisburg, Ohio, is applicable to drill presses, engine and turret lathes and milling machines for spot facing, boring, counterboring, valve seating and cutting convex and concave annular rings.

Rieger Multifacer

The head of the Multifacer is slotted for the insertion of a bit ground to the desired contour. The bit is locked in place with three set screws. Clearance slots provide for the escape of shavings and chips.

Three standard sizes of Multifacers will make cuts of 1 in. to 5 in. dia. Other sizes are available on special order.

The Multifacer is described as a production tool for long runs as well as a handy tool for occasional jobs.



Ohio Crankshaft radio frequency electronic heating machine and super-silent water-cooled motor generator set

Ohio Crankshaft Introduces Two-Station Electronic Heating Machine and Silent Water-Cooled Motor Generator

A new type two-station radio frequency electronic heating machine and a new super-silent water-cooled motor generator set for use in 3,000 to 9,600 cycle TOCCO units have been introduced by The Ohio Crankshaft Co., 3800 Harvard Ave., Cleveland 1, Ohio.

The electronic machine has a normal frequency of 450,000 cycles and a 20 kw. output capacity. It is described as the first tube-type unit to be designed with two independent work stations that can be operated at the same or widely different frequencies. The machine is a completely self-contained unit with work pan, power units and all controls included. It is 57 in. wide, 51 in. deep and 68 in. high.

The accessibility of the subassemblies of the machine is emphasized. As complete units, these have been mounted on beds which in turn rest on flat metal tracks, facilitating sliding out of the cabinet.

Distinctive protective features include shock mounting of tubes and power contactors, while tube filament voltages automatically are held constant over a wide range of line voltage variations. Inverse voltages are lower, due to polyphase rectification and the application of lower plate voltages.

Controls and operating meters are conveniently located above the work panels and in the timer cabinet situated on the left side of the "penthouse" frame. Manual controls for use during setups can be switched to automatic for production runs once the heating cycle is determined. The power output control includes plate voltage, grid drive and grid bias variations. The machine operates on 220/440 v.

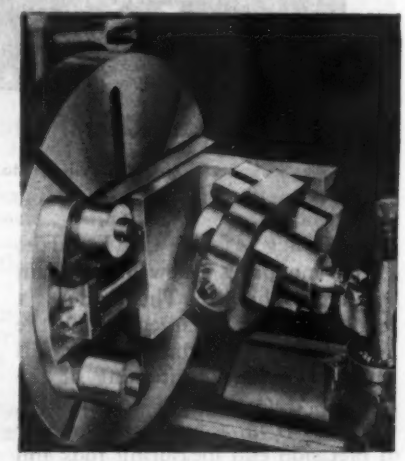
Installation of the new electronic machine in a production line requires hooking up but three connections: power and the inlet and outlet water lines. Skilled operators are not essential.

Water-Cooled Generator

Three major features distinguish the new water-cooled generator that now becomes standard in all 9,600 cycle TOCCO induction machines of 50 kw. capacity or more: it is absolutely silent even at full operating power; resilient mountings eliminate vibrations; and, because of the air-tight design, foreign matter cannot work into the mechanism.

Water flows through the generator cooling system at some 14 to 25 gal. per min., under 3 to 5 lb. pressure. An innovation in generator design is the water cooling of the generator bearings themselves.

The diameter of the generators of 50 kw. output and up ranges from 33 to 37½ in. O.D., while length varies from 4¼ to 5 2/3 ft. as the capacity output of the generator increases. Generators come with either sleeve or ball bearings as requirements demand. Lubrication is effected through pressure fittings located on the outside of the bearing brackets of all ball bearing models. With provisions made to prevent over lubrication, it is only necessary to lubricate the generator every 700 to 750 hrs.



Best Tools lathe angle plate

Best Tool Lathe Angle Plate Cuts Jig and Fixture Needs

A new lathe angle plate with accessories, No. 51, manufactured and sold by Best Tool Corp., 482 Sunrise Highway, Rockville Centre, Long Island, N. Y., is described as eliminating the need for many costly special jigs and fixtures usually needed to machine intricate jobs on a lathe.

Positioned by a locating nose plus

in the head stock spindle and bolted to the face plate, it is equipped with an adjusting screw and the necessary pages so that, by the use of size blocks or calipers, work may be located with a high degree of accuracy. It is readily set up on the lathe face plate, and without special jigs and fixtures it is possible to do any of a number of specialized machine shop jobs such as offset radius turning, cutting eccentrics, angle boring, turning compound angles and other operations not ordinarily considered as straight lathe work.

It is described as especially adapted to jig and fixture work where holes, straight or directional, must be held and spaced to close tolerances.

The lathe angle plate is designed for use on any 14 to 16 in. swing lathe. With its various fixtures it can handle cubes up to 5 × 5 × 5 in., plates to 5 × 10 × 1 in. and round stock up to 2½ in. dia. It can be lowered to about 5¼ in. off center.

Zagar Broaching Machine Improved to Make Possible Handling of Most Small Parts, Eliminating Reaming

Zagar Tool, Inc., 23880 Lakeland Blvd., Cleveland 17, Ohio, announces an improved model of its broaching machine. It is described as capable of broaching all small parts and about 80 percent of all parts work, while making it possible for screw machine shops to eliminate much reaming trouble on 0.001 and 0.0003 in. tolerances by broaching round holes instead of reaming them. In many instances a number of parts can be broached simultaneously, saving much time and expense.

Hydraulic actuation makes it possible for the unit to develop greater and smoother pulling power without chatter. The built-in relief valve on the pump affords adjustment giving up to 6,000 lb. pull. There are very few wearing parts to cause ultimate maintenance.

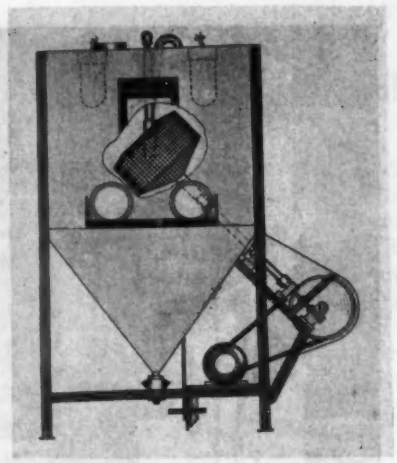
Specifications include: Oil tank holds 18 gal., cutting oil coolant system has 3½ gal. capacity, is self-contained, removable for cleaning and runs on 110 v.; length of body, 36 in.; overall height, 42 in.; overall width, 24 in.; overall including cylinder, 63½ in.

Leiman Rotary Sandblast Designed for Small Parts

Leiman Bros., Inc., 136-76 Christie St., Newark 5, N. J. announces a sandblast with a stationary nozzle, enclosing cabinet and rotating basket for small articles. The basket is motor driven at the proper speed to make the sandblasting spray fully effective. The sand is fed through the nozzle over and over again from the sand reservoir at the bottom of the cabinet.

The basket can be removed from the cabinet when it is desired to sandblast pieces of work of larger dimensions. Any speed of production required in the work may be easily approximated.

The basket is motor driven at the proper speed to make the sandblasting spray fully effective. Speed can be varied to suit production.

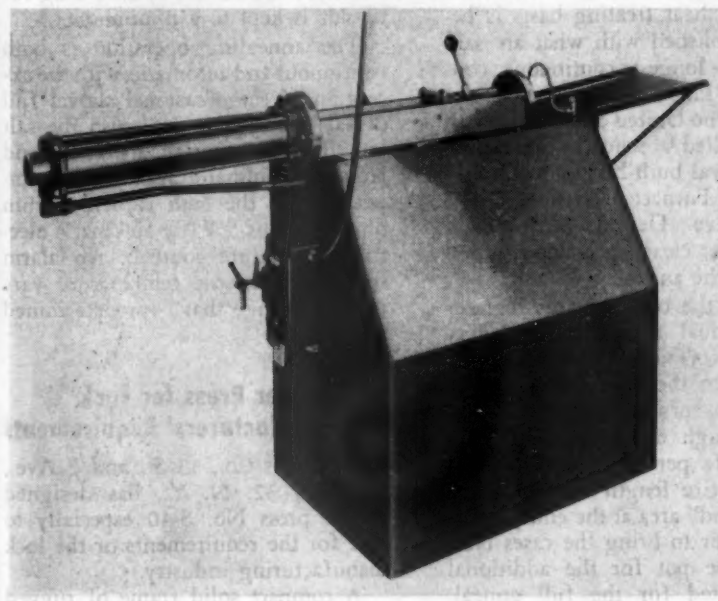


Leiman small parts sandblast

DeSanno Radiac Cut-Off Machine Speeds Shell Output

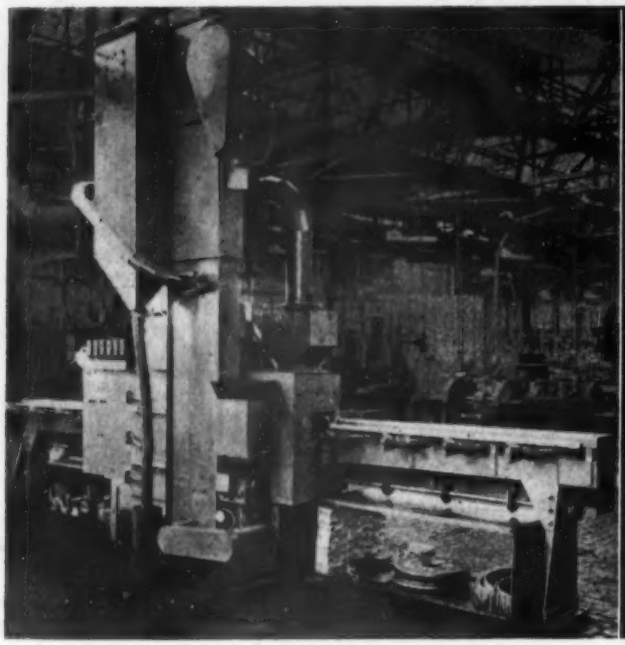
The Radiac abrasive cut-off machine, wet type, is being used to cut the 1½ in. end from 105 mm. shell in 7 to 8 seconds, according to the manufacturer, A. P. DeSanno & Son, Inc., Phoenixville, Pa.

Cutting is by a Radiac synthetic rubber bonded disc, 18 × 3/32 × 22 mm. RB 506 NE. The foot-treadle-controlled vise of the machine clamps the shell and supports it on both ends.

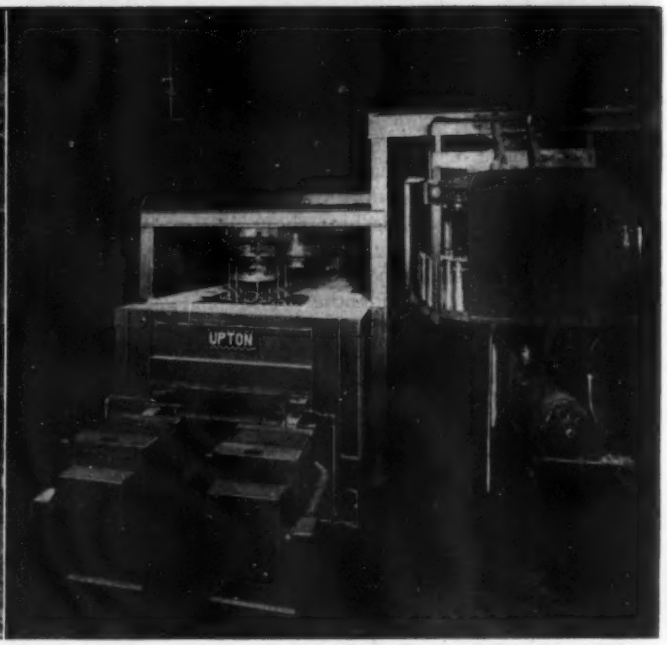


Zagar broaching machine

DeSanno Radiac cut-off machine



American Foundry Wheelapeening equipment



Upton electric salt bath furnace, end view

American Foundry Announces Wheelapeening Equipment Designed to Speed Peening, Cut Power and Save Cost

Wheelapeening equipment, a line of shot peening machines, has been announced by American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind. In these machines, a rain of metallic shot is directed against the part at high velocity. Each shot striking the surface makes a tiny dent or pit, so that the cumulative effect is to stretch the surface layers by cold working, to put them in a state of residual compression. This is said to prevent starting of fatigue cracks.

Skewed-dished rollers convey the part through the machine and impart a rotary motion so that all surfaces are exposed to peening action. Different models give different combinations of motion for peening parts of various shapes and sizes. The rain of shot is hurled at high velocity by the Wheelabrator airless, centrifugal blast unit; no compressed air generating equipment is needed.

Provision is made for the continuous reuse of shot, for the removal of broken shot and dust, and for the addition of new shot to the cycling system. The Wheelapeening method of shot peening is said to permit processing at much higher speeds, to reduce power requirements by 80 percent and to save production costs.

The Wheelabrator is a mechanical unit that utilized controlled centrifugal force instead of compressed air for throwing shot upon the work. Shot is fed to the center of the bladed wheel from an overhead storage hopper whereupon it is hurled by centrifugal force upon the work to be peened. An impeller rotates with the wheel proper and carries the shot to an opening in the stationary control cage, where it discharges to the bladed section of the wheel. At this point the shot is picked up by the inner ends of the throwing blades and is gradually accelerated in its passage to the periphery of the wheel.

Upton Electric Conveyor Type Salt Bath Furnaces Speed Bright Anneal of Brass Cartridge Cases

A full, absolutely bright, anneal of brass cartridge cases on a continuous production heat treating basis is being accomplished with what are said to be the longest continuous conveyor-type salt bath furnaces in operation in the United States, and with an unequalled absence of oxidation. This unit was built by Upton Electric Salt Bath Furnace Division, 7447 Melville Ave., Detroit, Mich. Pickling or other cleaning is not required following the anneal.

Each of the two furnaces replaces ten individual non-continuous duty furnaces previously used. Cases are lowered into the molten salt at one end of the furnace pot and moved along through the molten salt at a rate of 60 ft. per min. After traversing the entire length of the pot, a "turn-around" area at the end permits the conveyor to bring the cases back through the pot for the additional time required for the full anneal. The conveyor is arranged so that the cases remain in the bath the required time, yet in such a way that drag-out of salt is kept to a minimum.

The annealing operation is both continuous and automatic, with the exception of the occasional shovel full of salt required to replenish the salt lost through normal operation and from the nominal drag-out. The temperature of the bath is held within plus-or-minus 5 F. by automatic electric temperature control. An alarm sounds should the temperature vary more than that predetermined amount.

Bliss Power Press for Lock Manufacturers' Requirements

E. W. Bliss Co., 53 St. and 2 Ave., Brooklyn 32, N. Y., has designed power press No. S-40 especially to care for the requirements of the lock manufacturing industry.

A compact solid frame of rugged construction for standing loads be-

yond the rated capacity of the press is employed, with die space and operating area concentrated for specialty dies. The press is equipped with a semi-automatic lubricating system to the essential bearings.

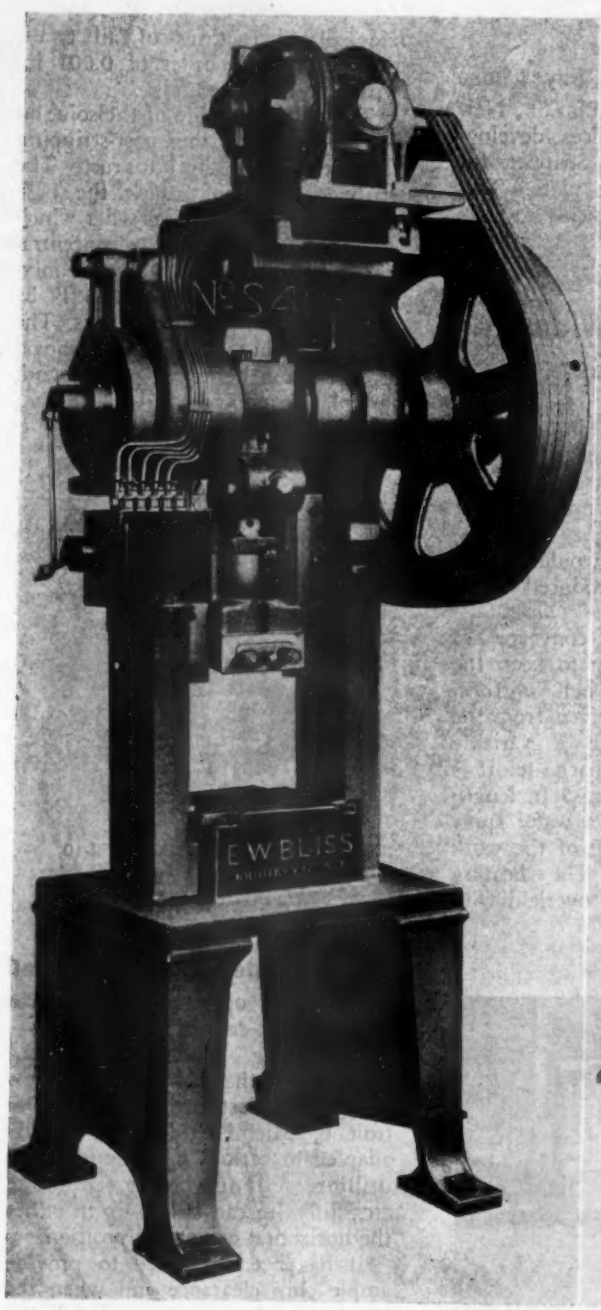
The operating speed is about 125 strokes per min.; however, considerably greater production can be obtained by attaching single or double roll feeds to the press. Operation of the feed can be front to back or back to front. The press is rated at 40 tons capacity at bottom stroke.

As to statistics: bed area, 14 × 14 in.; stroke, 3 in., die space, 10 in.

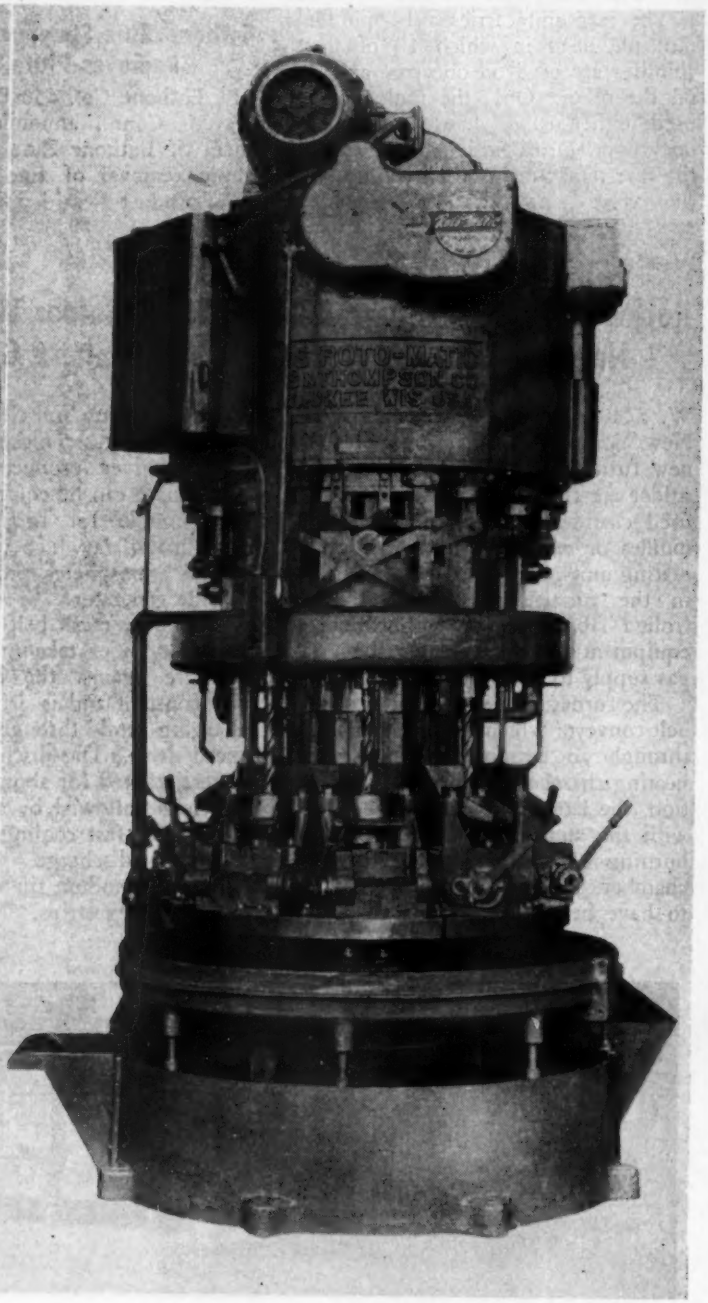
Davis & Thompson Vertical Roto-Matic Driller Adapted From Use of Twelve to Eight Spindles

A recently developed Roto-Matic driller of Davis & Thompson Co., 6411 W. Burnham St., Milwaukee, Wis., is an adaptation of a basic 36 in. work circle machine with 12 spindles to one with 8 spindles, incorporating the same power and capacity for work.

Fixtures are designed to take a cluster gear requiring the drilling of a 1-35/64 in. dia. hole 4 in. long. These fixtures are so constructed that they can, at a later date, when the current production program is completed, be adapted to a larger cluster gear which requires a larger diameter hole 7 in. long. The machine is of the nonindexing type. The worker need but lay the rough pieces into the fixture and depress lever to clamp; finished pieces are removed after the machine has completed a rotation. Feed of spindles and travel of machine are automatic.



Bliss lock manufacturing press



Davis & Thompson Roto-Matic driller

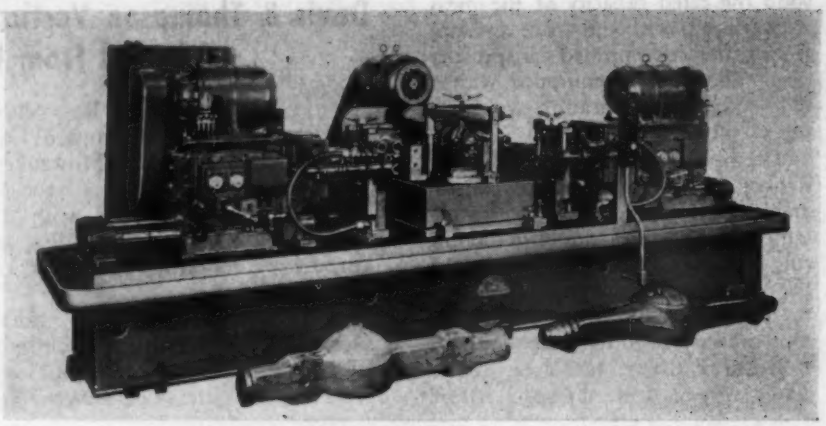
Snyder Special Drilling Machine Has Standard Units

By providing for interchangeability of multiple heads and bushing plates, standard hydraulic units have been built into a three-way special drilling machine by Snyder Tool and Engineering Co., 3400 E. Lafayette, Detroit 7, Mich.

The machine, for drilling two different axle housings, uses three Snyder standard guide-bar type, self-contained hydraulic units.

The two end units are equipped with interchangeable multiple heads and bushing plates, each set of which is used on but one of the two different axle housings.

The rear unit carries a 14-spindle multiple head in which 10 of the spindles are used on one part and 4 on the other. Only the tools to be used, either 10 or 4, are set up at one time. Drill guide bushings for the rear tools are installed rigidly on the fixture.



Snyder special drilling machine

Enthone Zinc Stripper Removes Plate, Saves Base

The Enthone Co., 450 Elm St., New Haven, Conn., announces development of Enthone Zinc Stripper, for rapid removal of zinc plate. This new product is said quickly to strip zinc plated coatings of all types; thickness of the order of 0.001 in. will strip in 30 seconds.

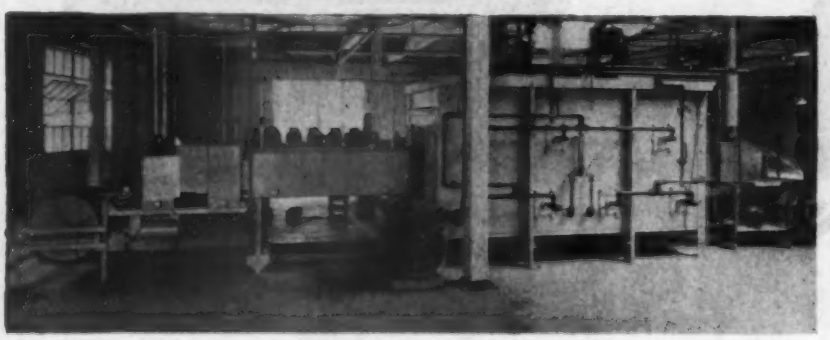
The aklaline nature of the solution largely removes the post-stripping tendency of the steel to rust. The stripper does not attack the base metal. It is supplied as salts which are aded to water in the concentration of 2-3 lb. per gal. and the mixture heated from 200 to 215 F. by heating coils in plain steel tanks. The stripper is said to be ideal for removal of zinc from defective plated work and plating equipment.

Rockwell Furnace Bright Anneals Silver Solder Without Need for Muffles or External Atmosphere Generators

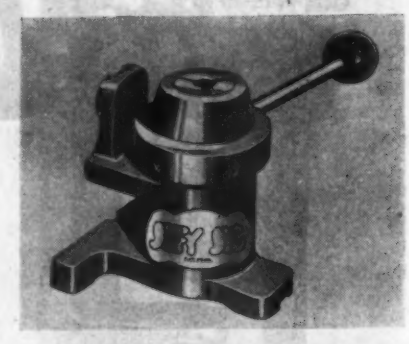
W. S. Rockwell Co., 50 Church St., New York, N. Y., has completed a new furnace in which coils of silver solder are clean annealed in an open fired chamber without the need for muffles or external atmosphere generating units. The desired atmosphere in the furnace is accurately controlled from the gas proportioning equipment which regulates the air-gas supply to the burners.

The furnace has a continuous mesh belt conveyor which carries the solder through an entrance vestibule, the heating chamber and the cooling section, the latter two being kept filled with the atmosphere formed by the burning of the gas in the furnace chamber. Such an atmosphere is said to have been found satisfactory for bright annealing and clean annealing of copper, brass, nickel silver and sterling silver products. However, the furnace can be equipped with an alloy muffle for bright annealing other materials which would require special atmospheres produced in an outside generator.

The alloy mesh belt conveyor has an air cylinder take-up to keep the pressure against the belt uniform and constant and is driven from the charging end through a variable speed drive. The discharge retort is water jacketed for about 5 ft. length which is followed by a water spray section for fast cooling of the work prior to discharge. The heating hearth is alundum tile overlaid with alloy wearing strips.



Rockwell clean or bright annealing furnace



Monarch Jiffy Jig Model J-10

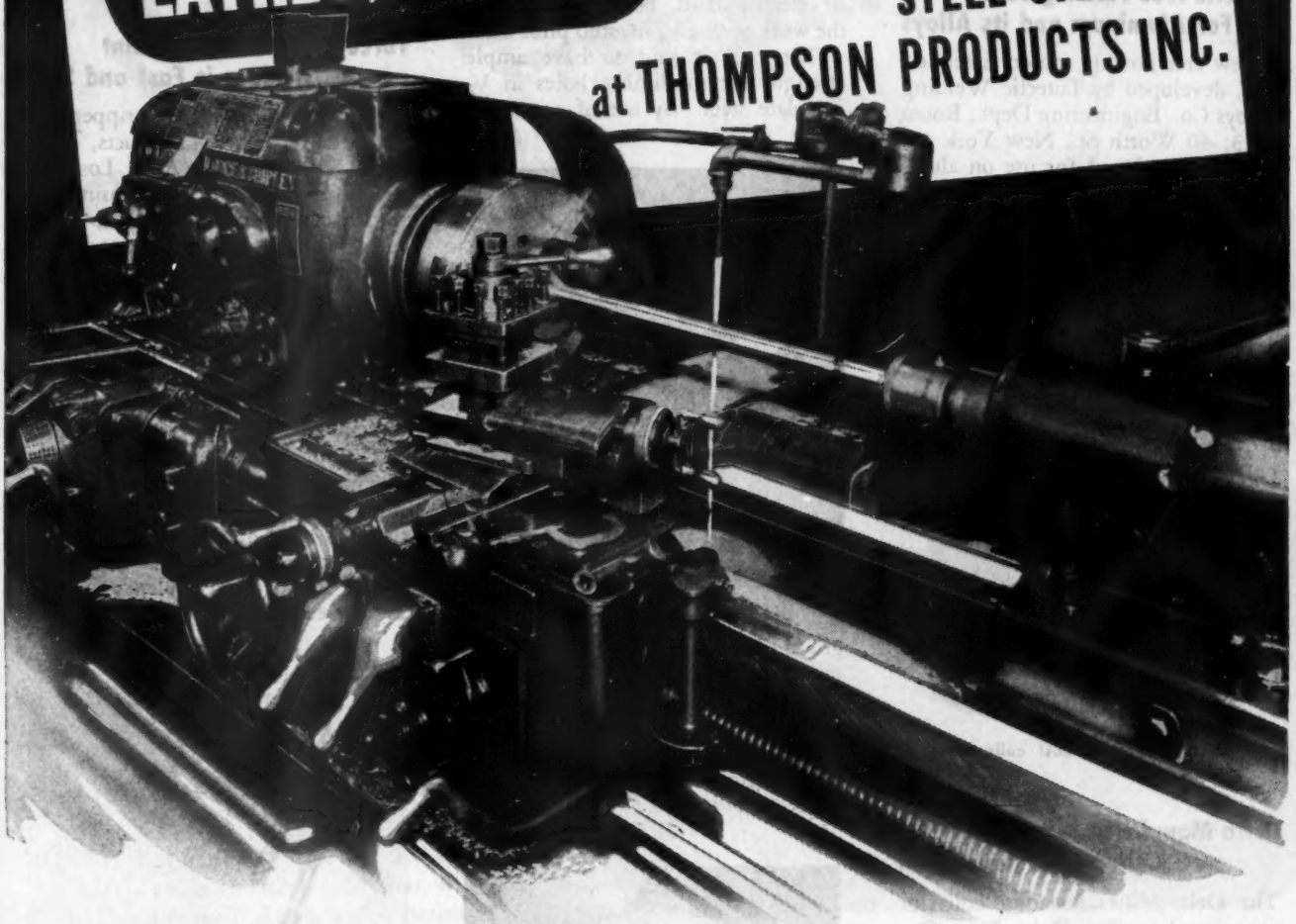
Monarch Jiffy-Jig Lever Operated Chuck Announced

A new lever operated chuck with a 1/16 to 1 in. cross section capacity—the Jiffy Jig, Model J-10—is announced by the Monarch Governor Co., 1832 West Bethune Ave., Detroit 6, Mich. Said to be readily adapted to various machine tools for drilling, milling, boring, grinding, etc., Jiffy Jig can be set up in either the horizontal or vertical position.

It has been designed to provide ample chip clearance and when the chuck is either open or closed, the collet has absolute zero axial move-

LODGE & SHIPLEY LATHES AT WORK

. . . producing special chromium-nickel alloy VALVE HEADS AND STEEL STEMS at THOMPSON PRODUCTS INC.



This large valve — built by Thompson Products, Inc., . . . West Coast Plant—is designed for use in huge natural gas engines for compressor plants making 100-octane gasoline.

The valve has a 6½" head and a 1¼" diameter stem which is heat-treated SAE 3140 steel. The head is made of special 21% chromium, 12% nickel alloy, which is really tough and difficult to turn. Yet despite the valve's size and unusual hardness, it must be machined to the same precision standards as are smaller valves for aircraft and automotive engines.

To fulfill these and other Thompson requirements, a lathe must be of the most advanced design. Careful consideration led to choice of Lodge & Shipley's new 20" Selective Head Engine Lathe.

Completely new in every part from headstock to tailstock, the 18", 20" and 22" Lodge & Shipley Lathes are a remarkable advance in lathe design and performance. These unusually fine machines possess tremendous strength, yet assure accuracy to the closest limits, permit full use of the cutting possibilities of all type tools.

Why not give your production the many advantages Lodge & Shipley Lathes offer? L & S Engineers will gladly assist you. Write for further details and for Bulletin 503BO.

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI 25, OHIO, U. S. A.

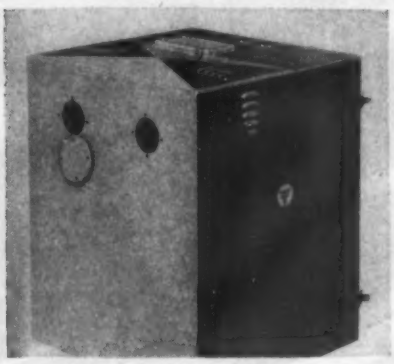
L & S LATHES

ENGINE — TOOL ROOM — AUTOMATIC — OIL COUNTRY LATHES

ment, positive axial dimension control. It consists essentially of a cap, base and operating lever. It may be used in conjunction with an automatic spring ejector and Warner and Swasey No. 2 collets may be used.

Eutectic Free Flowing Solder For Aluminum and its Alloys

A new free flowing solder, EutecRod 199, developed by Eutectic Welding Alloys Co., Engineering Dept., Room 1113, 40 Worth St., New York 13, N. Y., is designed for use on aluminum and aluminum alloys. It is said that, used with Autochemic Eutector Flux 199, EutecRod 199 will flow on aluminum as readily as ordinary solder on tin-plate, brass or copper.



Delta-Milwaukee dust collector

Delta Manufacturing Dust Collector is Announced

The Delta-Milwaukee dust collector announced by The Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis., is described as compact, self contained, designed for use with an individual machine and provided with special fittings permitting attachment to any one of several machine tools of that company's manufacture.

The dust collector is said to be activated by a powerful squirrel-cage type fan which sucks both fine and heavy dust and small particles through an efficient air filter and moves 30 cu. ft. of air per min., developing a static suction of 3 to 4 in. The filter is a permanent, cleanable one with low air resistance and is completely fireproof. A special woven glass filter is also available, the company states, for collecting "flour fine" dust.

Power is furnished by a 1/3 h.p. motor of 3450 r.p.m. with sealed-for-life ball bearings.

Rieger Circle Cutter Cuts Up to Half-Inch Plate

The Rieger Mfg. Co., Dept. AM-9, Miamisburg, Ohio, announces a circle cutter adjustable for holes of 2 in. to 8 in. dia., while using a $\frac{1}{4} \times \frac{1}{4}$ in. toolbit of any desired contour. The tool is used in a lathe, drill press or electric drill, being centered in the work with a $\frac{1}{4}$ in. stub pilot drill.

The tool is said to have ample strength for machining holes in $\frac{1}{2}$ in. plate steel. By use of a suitably

Rieger circle cutter

ground bit, the periphery of the hole can be straight, chamfered, rounded, or stepped. Two models are standard, one having a $\frac{1}{2} \times 2$ in. round shank and the other a No. 2 Morse taper shank. Special models will be made to order.

Dayton Rogers Countersink gage

Dayton Rogers Countersink Gage Includes Five Angles

The Dayton Rogers Mfg. Co., 2835 12 Ave. South, Minneapolis 7, Minn., now has for distribution a gage capable of checking machine countersinks as to size and shape for grinding and sharpening, as well as the finished countersunk screw adaptors.

Five different angels are included in the countersink gage, including two gage view profiles in each instance. The gages are used as standard for both grinding the machine countersinks, as well as checking the finished work and are furnished free upon request on company letterhead.

Turco Water Soluble Paint Stripper is Fast and Safe

A water-soluble paint stripper developed by Turco Products, Inc., 6135 South Central Ave., Los Angeles, Calif., is said, after hosing off, to leave a clean, paint free, water break surface requiring very little after treatment before further processing.

The new material, known as Turco Stripper L-780, is described as non-corrosive on metals, safe on wood with no tendency to cause warping and in line with Navy specifications C-113 for non-inflammability.

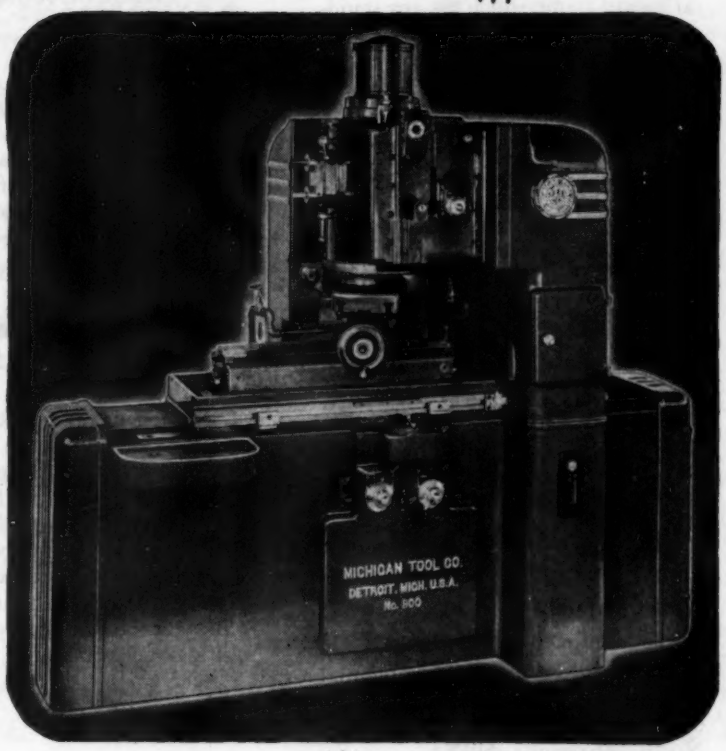
Time and labor saving advantages listed include: slow rate of evaporation, no need of pre-cleaning oily or road-film covered surfaces before applying stripper and tendency to form a soft, easy-to-remove slurry.

Mereco rotating handle screwdriver

"Mereco" Screwdriver with Rotating Handle, Offset Shank

The Mechanical Research Co., 601 Failing Bldg., Portland 4, Ore., announces a screwdriver, the "Mereco," which employs a rotating handle and an offset shank to enable the operator to attain a continuous

THE 4 FREEDOMS OF GEAR FINISHING



1. FREEDOM FROM INACCURACIES

The Michigan 900, uses the basic "rack" to generate gear teeth. It is the most accurate gear finishing machine ever developed. The best proof of this is the inherent quietness of rack-finished gears.

2. FREEDOM FROM DISTORTION

Gear Finishing on a Michigan 900 is a free-cutting and *not* a cold-working process. The machine can also be set to pre-compensate for heat-treat distortion.

3. FREEDOM FROM SHUT-DOWNS

The Michigan 900 Rack Shaving Machine is one of the few machine tools in the world that will machine up to 100,000 units before sharpening tools.

4. FREEDOM FROM COST

The Michigan 900 represents the lowest-cost-per-gear method of gear finishing. Well over 1,000,000 gears have been finished with a single rack. Can be operated by relatively unskilled labor.

For "Post-war", a number of important improvements have now been added to the Michigan 900—the machine that has never been licked.

Ask for a copy of Michigan Tool Company's Gear Finishing Manual (No. GF-43)

ORIGINATORS of GEAR-SHAVING

MICHIGAN TOOL COMPANY

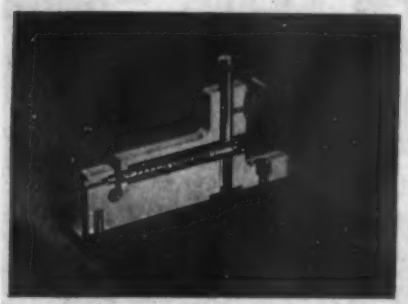
7171 E. McNICHOLS ROAD . . DETROIT 12, U. S. A.

drive by an easy wrist motion. It is said to be many times faster than the ordinary screwdriver.

It can be used for slotted or special screwheads and is simple and compact in construction.

McGill Faxfilm Makes Fast, Economical Surface Inspection

R. D. McGill, 5109 Mayfield Rd., Cleveland, Ohio, is manufacturing Faxfilm, by use of which a contact replica can be made of any surface; the resultant film is mounted in a cardboard frame which fits any standard projector, where is can be enlarged 100 diameters or more and shows all contours in three dimensions. The film can be filed for future record.



Wales-Strippit hole punching unit

Wales-Strippit Hole Punching Unit Reduces Press Down Time

Announcement of new horizontal type "H" Hole punching units has been made by Wales-Strippit Corp., North Tonawanda, N. Y.

These units are designed for punching holes in flanges, angles, container sides and similar shaped and formed work. Punching holes in the sides of the work instead of on top of flat surfaces is made possible by designing this unit so the punch moves back and forth horizontally instead of up and down. Type "H" units are said to eliminate expensive, time-consuming, built up, single-purpose cam action dies.

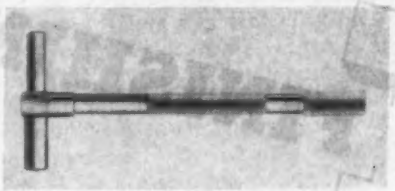
Each unit is independent and self-contained. Minimum center to center displacement is 7/8 in.

Punch, die, guide and stripper spring are held as an independent, self-contained unit by the holder, which keeps the punch and die in perfect alignment. Nothing is attached to press ram.

All working parts are hardened and ground and the holders are all-steel construction.

Brand Telescoping Gages in Sets Are Now Available

Telescoping gages, introduced by Brand Tool & Supply Co., 500 West Washington Blvd., Los Angeles 15, Calif., are hardened and ground to



Brand Telescoping gage

the proper radius. They are made in four sizes, i.e., 5/16 to 1/2 in., 1/2 to 3/4 in., 3/4 to 1 1/4 in. and 1 1/4 to 2 1/8 in. Sets of three gages, ranging from 1/2 to 2 1/8 in., or sets of four from 5/16 to 2 1/8 in., are available; each set is enclosed in a leatherette case.

Sav-A-Tool Method Lowers File Cost at Least 50 Percent

Sav-A-Tool Corporation, 3571 Eastern Ave., Cincinnati 26, Ohio, announces a method which it describes as cutting file costs at least 50 percent. The renewal method is said not to affect the original temper of the old file, but to sharpen carefully all cutting edges, remove all burrs and to give anti-rust treatment.

Files can be restored by the Sav-A-Tool method as many as three times, it is said.

National Mity-Midget sander

Mity-Midget Sander Made by National for Small Spaces

The Mity-Midget sander, produced by National Air Sander, Inc., Rockford, Ill., is described by the manufacturer as light weight, non-vibrating, compact and flexible. It will do either wet or dry sanding and is said to be fast, easy to load and adaptable for close quarters and fillet work.

The sander weighs 3 1/2 lb., is 4 1/4 in. high and 5 1/2 in. long. The air-operated motor is sealed by synthetic rubber housing and operates on prelubricated ball bearings. The sanding pad does not revolve, but moves in a circular motion so that each grain of sand scribes a 3/16 in. circle and makes 5,000 cycles per minute. Four pieces of sandpaper for this machine can be cut from a standard 9 in. × 11 in. sheet.

Carboloy Company Adds Smaller Tools to Line

Carboloy Company, 11155 East 8 Mile Road, Detroit, Mich., has added a 1/4 in. size tool to its line of styles 4 and 7 right- and left-hand standard turning tools. The new standard available from stock in grade 78 for steel cutting and in grade 883 for all other materials have a 1/4 in. square shank 1 1/2 in. long. Tools carry a tip measuring 3/32 in. thick, 3/16 in. wide by 5/16 in. long.

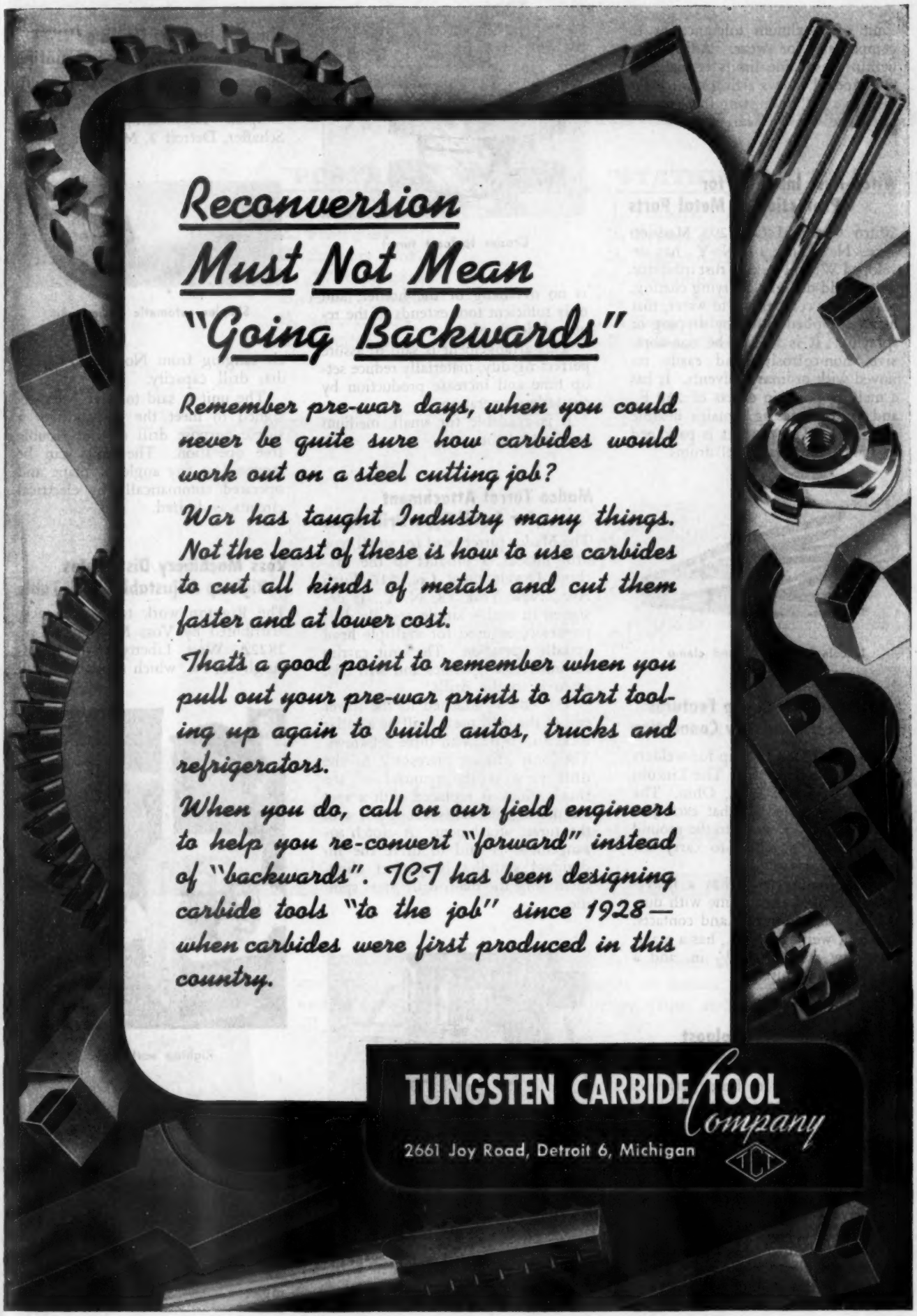
Standard TeBo fixed limit gage

Standard Gage Produces TeBo Fixed Limit Gages

Standard Gage Co., Poughkeepsie, N. Y., is now in production on TeBo fixed limit type gages, as sole licensee in the Americas. Company officials describe these gages as having superiority in simplicity, ease of operation, accuracy and gaging speed over more familiar types.

The gaging head is a section of a sphere with a protective plating of hard chromium. Due to this plating and because the points of gaging contact are as numerous as the number of theoretically widthless lines which might be inscribed on the surface of a sphere, they are said to retain their extreme accuracy over exceptionally long periods of service.

On the periphery of the spherical head is a smaller projection which is also a part of a true sphere. This propection may be adjusted to the


Reconversion
Must Not Mean
"Going Backwards"
Remember pre-war days, when you could never be quite sure how carbides would work out on a steel cutting job?
War has taught Industry many things. Not the least of these is how to use carbides to cut all kinds of metals and cut them faster and at lower cost.
That's a good point to remember when you pull out your pre-war prints to start tooling up again to build autos, trucks and refrigerators.
When you do, call on our field engineers to help you re-convert "forward" instead of "backwards". TCT has been designing carbide tools "to the job" since 1928—when carbides were first produced in this country.
TUNGSTEN CARBIDE TOOL Company
2661 Joy Road, Detroit 6, Michigan
TCT

limit of maximum tolerance or to compensate for wear. Adjustment within reasonable limits is made by two tapered screws acting against the inset in a "V"; adjusting these screws alters the "no go" factor.

Witco Rust Inhibitor for Protection of Metal Parts

Witco Chemical Co., 295 Madison Ave., New York 17, N. Y., has developed Witco No. 673 rust inhibitor. It is a cold-dip, rapid drying coating, of viscosity comparable to water, that may be applied either by dipping or spraying. It is said to be non-abrasive, non-corrosive and easily removed with ordinary solvents. It has a melting point in excess of 250 F., and yet the coating remains flexible at —20 F. The product is packaged in standard 55 gal. steel drums.

Lincoln low-cost ground clamp

Lincoln Ground Clamp Features Low Cost, Dual Jaw Connection

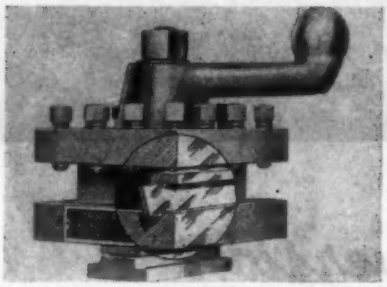
A low-cost ground clamp for welders has been announced by The Lincoln Electric Co., Cleveland, Ohio. The clamp is designed so that each jaw connects independently to the ground cable, enabling either to carry the current.

The ground clamp has a heavy-duty processed steel frame with durable copper conductors and contacts. The unit weighs 1½ lb., has a maximum jaw spread of 2½ in. and a rating of 300 amp.

Crozier Announces Toolpost Turret for Bench Lathes

A toolpost turret for bench lathes is announced by the Crozier Machine Tool Co., successors to the C-W-C Corp., Prairie at 118 St., Hawthorne, Calif. It is said to be specially adapted for cutting-off operations.

One side of the block is channeled to receive a standard beveled section cut-off blade, which is supported at the top by a hardened channeled bar, which provides maximum bearing surface for the locking bolts. There



Crozier toolpost turret

is no overhang of the holder, and only sufficient tool extends to the required depth of cut.

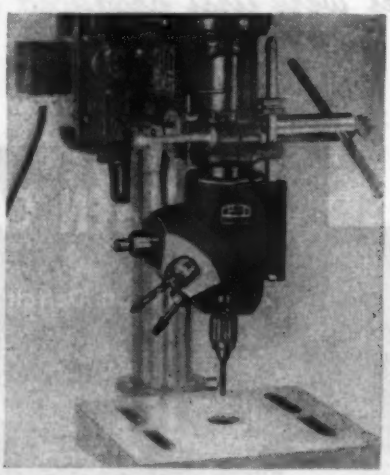
This arrangement is said to assure perfect rigidity, materially reduce set-up time and increase production by chatterless operation.

It is available for small, medium and large lathes.

Madco Turret Attachment For Small Type Drill Press

The Madco turret head for small type drill presses, a product of the Machine Development Co., 516 Fifth Ave., New York 18, N. Y., is designed to enable single spindle drill presses to be used for multiple head spindle operation. The unit carries six individual spindles and will take up to ⅜ in. dia. drills.

The unit is attached to the lower end of the drill press quill by a collar locked in place with three setscrews. The only change necessary to the drill press is the removal of the chuck which is replaced with a special driving mechanism supplied with the turret attachment. A clutch arrangement is said to drive the individual spindles in perfect alignment with the main drill press spindle.



Madco turret attachment

Simplex Designs Drilling Unit for Machine Mounting

A new single purpose automatic drilling unit has been developed by the Simplex Engineering Co., 14519 Schaffer, Detroit 2, Mich. in 3 mod-

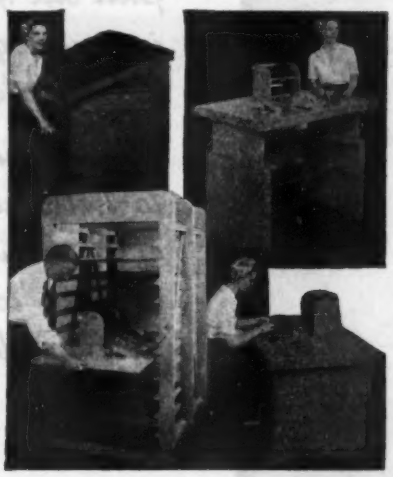
Simplex automatic drilling unit

els ranging from No. 80 to ⅜ in. dia. drill capacity.

The unit is said to have been designed to meet the demand for a single purpose drill unit of trouble free operation. The units can be mounted at any angle or plane and operated automatically by electrical circuits as desired.

Voss Machinery Distributes Rightop Adjustable Work Table

The Rightop work table and rack, distributed by Voss Machinery Co., 2822A West Liberty Ave., Pittsburgh 16, Pa., which raises, tilts and



Rightop work table

has interchangeable tops, is said to make it possible to keep up to 12 jobs on the board at one time.

The removable top lifts off and slides into the rack until needed again. None of the work on the top need be displaced.

The table height is adjustable by simply turning the crank. The top can be tipped to get the desired angle.

100 CASE HISTORIES

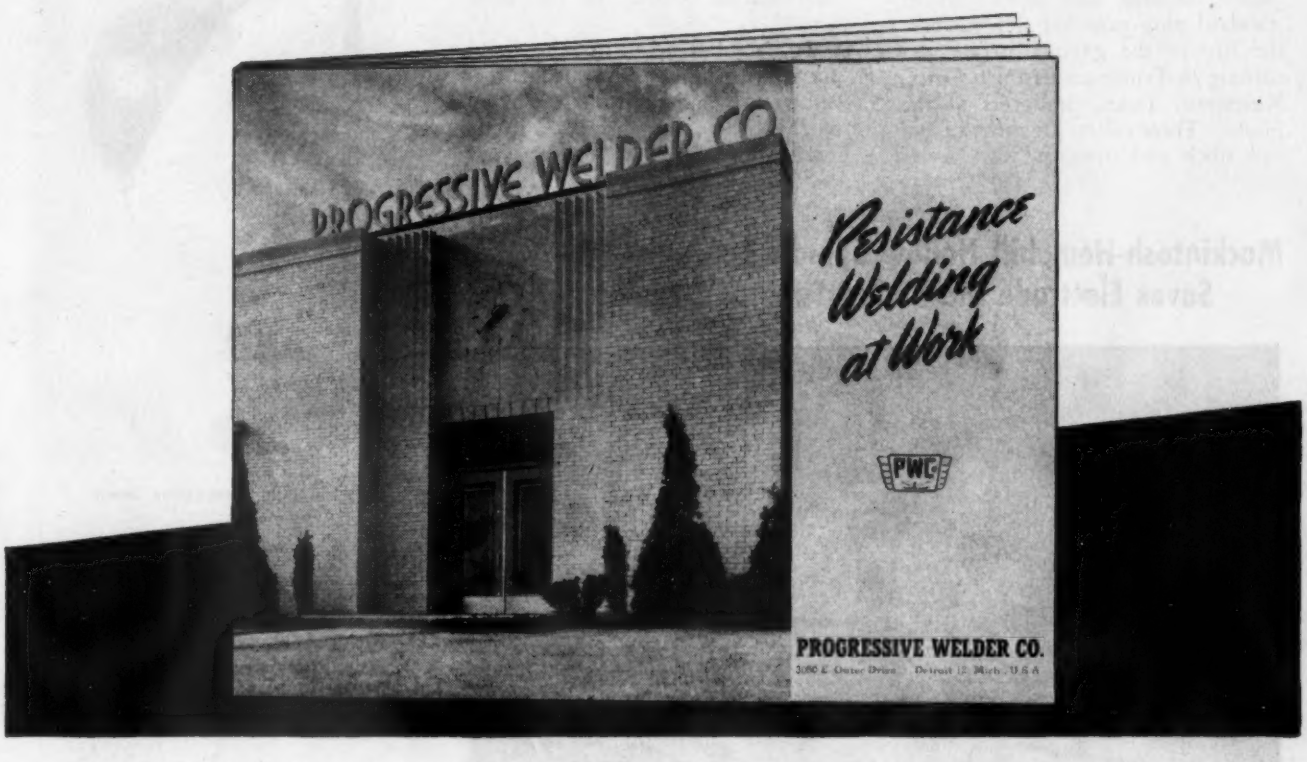
of typical applications in Industry of

"PORTABLE" WELDING

1. Portable machines
2. Push guns
3. Scissors guns
4. "C" type guns
5. Pinch type guns
6. Special guns
7. Portable Seam Welders

"STATIONARY" WELDING

1. Pedestal Spot welders
2. Rocker arm welders
3. "Temp-A-Trol" welders
4. Projection welders
5. Multi-spot welders
6. Seam welders
7. Special Uses of Welders



Write for your copy on your Company Letterhead. Ask for it by name. "RESISTANCE WELDING AT WORK" or by number WP-44

On all kinds of industrial products: automobiles, stoves, refrigerators, containers, aircraft, etc. . . . All kinds of metals: aluminum, stainless, carbon steels, alloy steels . . . In heavy gages and light gages . . . On all kinds of shapes.

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No metal fabricating plant should be without one of these idea-provoking 60-page books . . . the story of *how* resistance welding can be and is being used to simplify construction, cut costs, speed production and improve the value of finished products. Includes many new uses developed as a result of the war.

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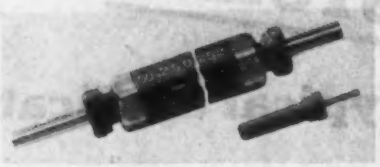
Haynes Stellite Boring and Reaming Blades are Available

Boring and reaming blades of Haynes Stellite cobalt-base alloy are available from Haynes Stellite Co., a unit of Carbide and Carbon Corp., Kokomo, Ind. These blades are available in 98M2 and Star J-Metal, with 98M2 especially recommended for boring steel. They are furnished to users' specifications, finish-ground to required tolerances.

Turner Tenite Collets Extend Gage Life, Speed Inspection

Black and red collets of Tenite plastic, tapered and slotted to fit standard plug gage handles, increase the life of the gaging surface, according to Tennessee Eastman Corp., Kingsport, Tenn., producers of the plastic. These collets are turned from rod stock and marketed by Turner



Turner Tenite gage collets

Gauge Grinding Co., Ferndale, Mich.

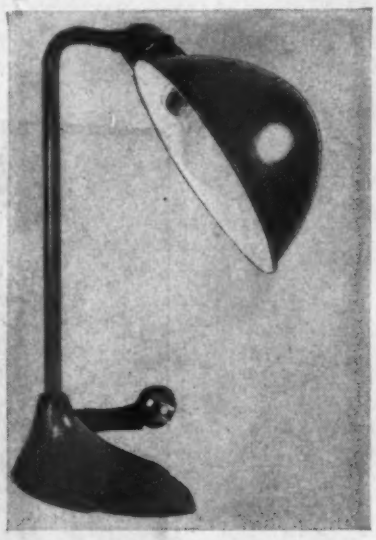
The use of Tenite for these collets is said to prevent scratching or burring of the gaging surfaces. As the "go" and "no go" ends are worn beyond tolerances, they are simply cut off, and an unused end is ready for gaging. Red collets make for quick identification of the "no go" members.

To facilitate resetting, the shoulder of the collet is notched for an end wrench, and a thin slot the length of the collet takes up slack in the locked position.

Reliance Announces Line of Swivelier Inspection Lamps

The Reliance Devices Co., Dept. AM, 30 Irving Place, New York 3, N. Y., has brought out a line of portable inspection lamps mounted on two-pound bases so they will not tip over. They are available with either 9 or 12 in. arms, in brown or gray, and in a choice of three different types of shades.

The socket is the regular "Swivelier" type which is described as universally adjustable and requiring no



Swivelier inspection lamp

wing nuts or set screws for adjustment, as inside spring construction of shell holds unit in place in any position. The base has three wood screw holes, permitting the entire unit to be "pinned up."

Mackintosh-Hemphill Hollow Spindle Lathe Saves Electrode Machining Time and Equipment Cost

Mackintosh-Hemphill carbon electrode lathe

A hollow spindle turret lathe designed and built by Mackintosh-Hemphill Co., Bingham and Patterson Sts., Pittsburgh, Pa., reportedly performs all operations in machining carbon electrodes up to 31 in. dia. and 12 ft. long, or as small as 11 in. dia. and 5 ft. long.

With mechanical equipment for both loading and unloading, the machine cuts threads either with the tapering bar at the rear of the bed or through special gearing in the apron. It has an anti-friction headstock with the 32 in. hollow spindle mounted on forced feed lubricated bronze bearings. Each end of the spindle, which has a speed range of from 6 to 120 r.p.m., is equipped with 3-jaw universal chucks which support the electrode during the machining operation.

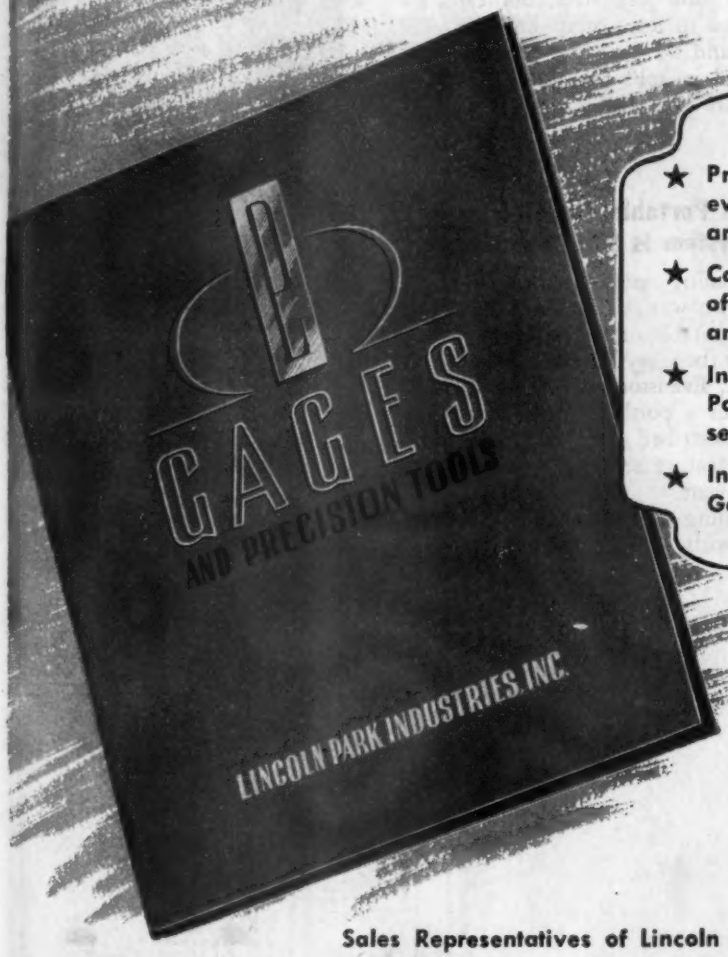
An electric eye is used to position the headstock so that the loading rig can enter the spindle without interfering with the chucks. This arrangement is said to eliminate most of the time required to set up jobs on other types of lathes producing these electrodes.

Enthone Ebonol "C" Process Gives Copper High Adhesion

The Ebonol "C" process of the Enthone Company, Elm St., New Haven, Conn., is described as producing a stable, adherent, non-reactive cupric oxide coating on copper alloys that gives high adhesion of lacquers, paints and enamels under severe weathering conditions. The inert nature of the coating is said to prevent reaction between it and the organic finish.

A nap-like finish is obtained, presenting a relatively absorbent base to anchor the paint. The process is suitble for treating copper alloys containing from 60 to 100 percent copper. Since the lower copper alloys are colored a mahogany brown, while those of more than 65 percent are col-

A NEW, *Completely Revised Catalog* OF LINCOLN PARK PRODUCTS



- ★ **Provides quick and unmistakable selection of every standard type, size, and price of gage and tool manufactured by Lincoln Park.**
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A copy of this valuable book is now ready for you. It will be supplied either by your Lincoln Park representative or on request directly to the factory. There is no charge or obligation. Requests by mail must be made on company letterheads.

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ARMY E NAVY

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Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

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ored black, the finish is not suitable as a base for clear lacquers or for one coating of white pigmented lacquers.

Applications is by simple immersion of the work in a dilute solution of the salts at about 210 F. for approximately 10 min.

Keller Tool Company Foot Control Valve is Ready

A compressed air foot valve to be used with air operated equipment is announced by the manufacturer, Keller Tool Company, Grand Haven, Mich. Safety of the operator is accomplished by the kick guard which prevents accidental operation.

The valve is furnished in lock and non-locking types. A simple adjustment of the lever-locking device prevents engagement of the operating pedal and changes the locking type to the non-locking type.

Keller three-way foot valve

Details include: Heavy cast iron body; neoprene valve seat; heat treated and precision ground valve operating stem; heavy gage steel kick guard; brass screen air strainer; net weight, 12½ lb.

Lyon-Raymond Hydraulic Lift Truck Also a Tiering Machine

What is said to be a definite departure in material handling equipment has been developed and introduced by Lyon-Raymond Corporation, 1579 Madison St., Greene, N. Y. It is a combination lift truck and tiering machine.

This high-lift truck weighs 495 lb. It is of special tubular and formed steel construction, and provided with a powerful floor lock and controlled fingertip lowering device. It turns readily within its own length.

The standard stock model has a capacity of 1,000 lb., with platform 24 in. wide × 30 in. long and a raising range of 42 in.

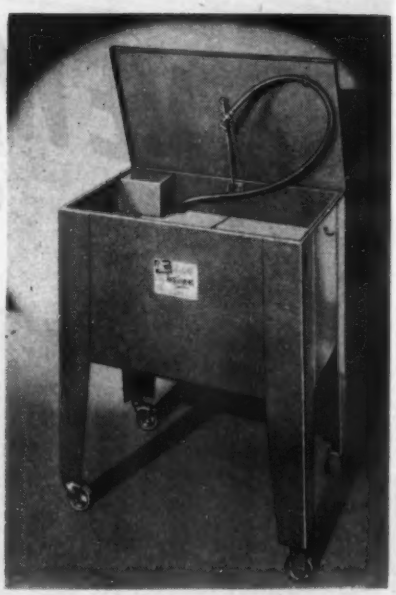
Fotopor Paper Determines Porosity of Plated Coatings

A new test paper, Fotopor, for detecting porosity in plated coatings has been announced by the Hanson-Van Winkle-Munning Co., Matawan, N. J. It is most commonly used for determining the porosity of nickel deposited on iron and steel, but can also be used to test chromium, copper, brass and tin deposits. Fotopor is furnished in rolls containing 150 lin. ft., 2 in. wide. Rolls are about 4 in. dia.

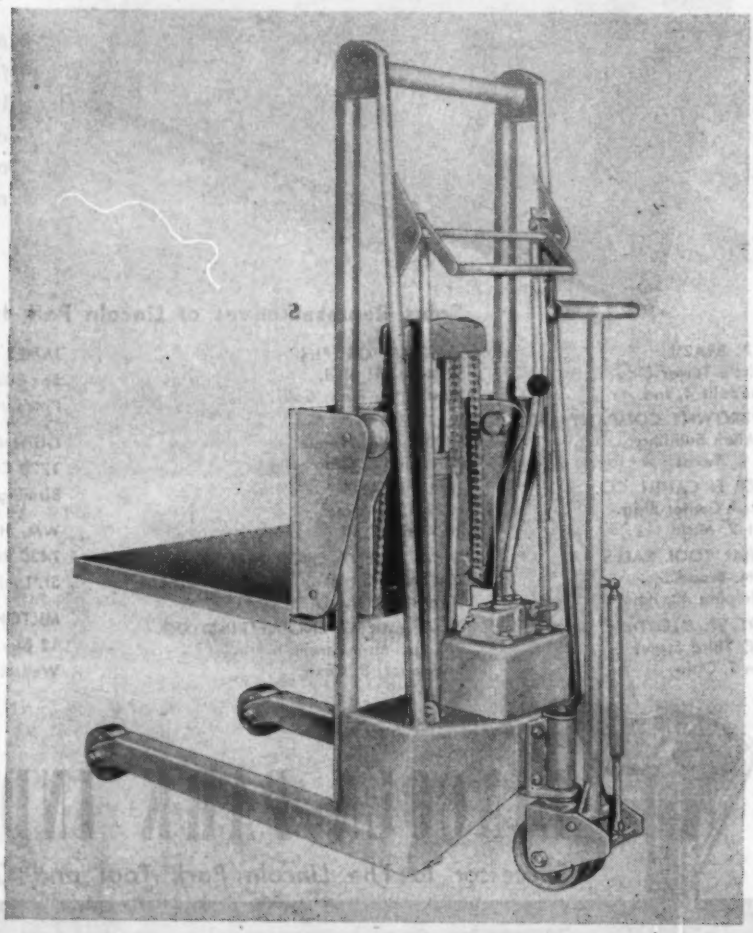
Gray-Mills Portable Cleaning System Is Self-Contained

A parts cleaning system combing the utility of two washers into one self-contained portable unit, has been announced by the Gray-Mills Co., 1948 Ridge Ave., Evanston, Ill. The system includes a portble cleaner with what is described as an unique "Swisher" feature and cold-cleaning Flo-Bac solvent.

The cleaning unit is fully portable, equipped with a built-in gear-type pump. A safety cover eliminates fire hazards. The Flo-Bac solvent is used cold and degreases parts without pitting and corroding. It is used repeatedly and constantly filtered.



Gray-Mills parts cleaning system



Lyon-Raymond lift truck and tiering machi

Molybdenum cast steels make tough, wear-resistant parts. Our data on practical analyses are always available.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

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500 Fifth Avenue · New York City

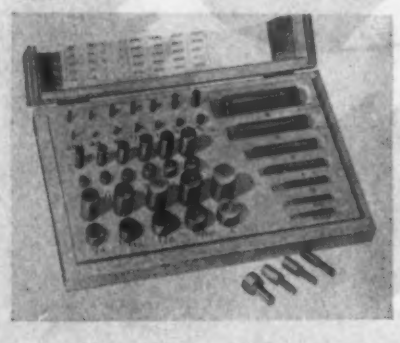
Airco 90-A Electrode for Welding Light Gage Steels

Air Reduction, 60 East 42 St., New York 17, N. Y., has introduced Airco No. 90-A electrode, an improved version of the smaller size Airco No. 90, especially designed for welding light-gage chrome moly and similar steel used in aircraft welding.

It is made to a completely new coating formula which is said to provide notably smoother arc operation, better appearance of deposits, stronger arc action reduced slag interference. and excellent operation at high currents without deterioration of coating at stub end. It is available in 1/16, 5/64 and 3/32 in. dia. and is equally efficient for a.c. and d.c. operation, straight or reversed polarity.

Scherr Plug Gage Blank Sets Speeds Special Gage Making

The George Scherr Company, 200 Lafayette St., New York 12, N.Y., has announced its new Atlantic emergency set containing 36 cylindrical plug gage blanks in steps of 1/16 in. with handles. This emergency set will permit any shop to produce any size plug gage from 0.029 in. to 1.000 in. in just a few minutes work on a cylindrical grinding machine. These

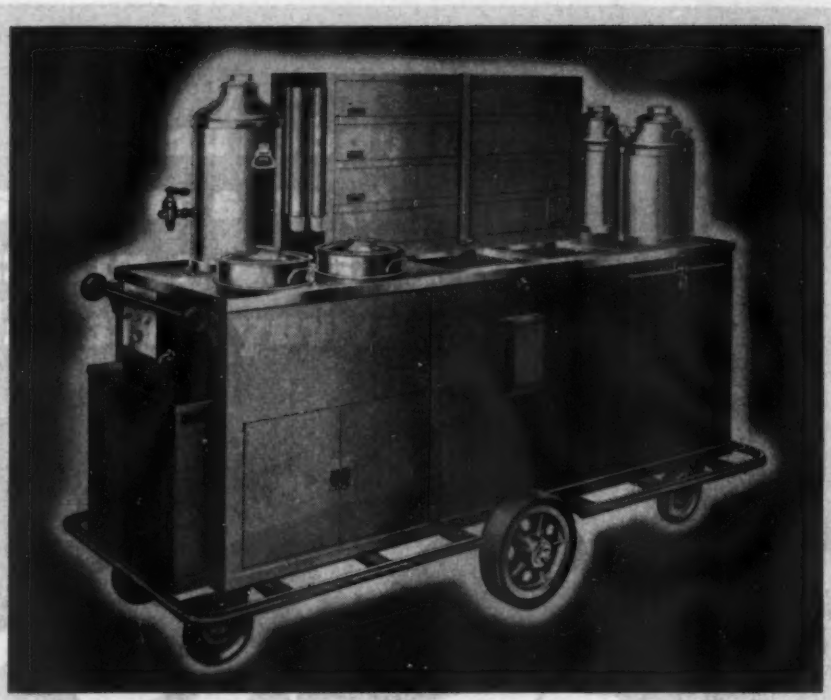


Scherr plug gage blank set

gages are oil hardened throughout. shank finish ground and centers on both ends are lapped. It is necessary to grind the blanks to produce a commercial finish gage. Where higher standards and closer tolerances are involved, the gages are then lapped.

Blickman Has Developed a Mobile Canteen for Varied Use

S. Blickman, Inc., Weehawken, N. J., has developed a line of mobile canteens designed to cover a wide range of varied requirements, with emphasis on speedy and efficient service. The canteens are said to embody in their construction all the latest scientific developments proven in actual use.



Blickman Model 1889 mobile canteen

Overall the canteen is 87 in. long × 38 in. wide × 65 in. high. Its body is 78 in. long × 30 in. wide × 36 in. high to work top. Fran is of 3 in. ship-channel chasis, reinforced with angle iron.

Top of body is of 14 gage stainless steel with insulated sliding covers of 18 gage stainless steel for cold drink compartments.

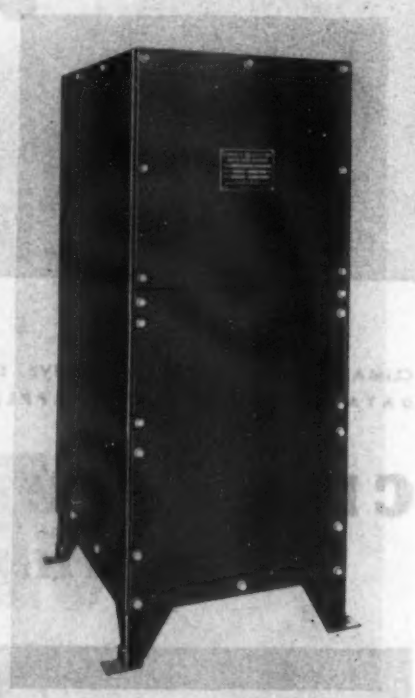
Food containers and the coffee-dispenser are kept warm by electric heating elements, for which power is secured from a light socket.

General Electric Makes 2,000 Ampere Plating Rectifier

General Electric Co., Appliance and Merchandising department, Bridgeport, Conn., has added a 6-volt, 2,000-amp. plating rectifier, the G-E "2,000," to that firm's line. This rectifier, with four times the capacity of the 500-amp. rectifier, can be used with greater economy in large installations than four of the smaller units connected together. It provides 12 kw. output capacity in one rectifier unit. Complete automatic control of the anodizing power supply can be had with this rectifier as well as with the smaller units by using a G-E voltage regulator.

Different output ratings are possible: 6 v., 2,000 amp. or 12 v., 1,000 amp; 24 v., 500 amp. or 48 v., 250 amp. The G-E "2,000" rectifier has two separate secondary circuits each feeding a separate bank of copper-oxide rectifier stacks which may be connected either in series or parallel on the d.c. buses in the rear of the unit.

This rectifier is available in two a.c. supply ratings: 230 v. and 440 v., three phase, 60 cycles.



G-E 2,000-amp. plating rectifier

STEEL SERVES THE GUNS
WITH MILLIONS OF SHELLS

Steel moves along shell production lines in a smooth, continuous flow. Each operation brings it nearer the size and shape used to drench the enemy with destruction — at lowest cost in American lives.

Converting steel into many different types of shells by the millions calls for adaptability of resources and equipment, for ability of management to solve new production problems quickly, and for resourcefulness of men and women workers in mastering new skills and methods.

The American *will to do* — at J&L and throughout the steel and allied industries — is such that the shell program keeps pace with the changing needs of the armed forces and supplies the guns as the gunners serve them — swiftly, accurately, with devastating effectiveness.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH, PENNSYLVANIA

J&L STEEL

CONTROLLED QUALITY STEEL FOR WAR

BIG SHELLS SAVE LIVES

"Black Panther," invasion pin-up gun, is an Army Ordnance 8-inch 23-ton mobile weapon that fires 256 pounds of steel and high explosive a distance of 20 miles so accurately it will drop its big shells "right on the courthouse steps." This gun out-ranges Germans' best gun by 2 miles, fires shell 100 lbs. heavier. Half the total production of steel shells is being made in Pittsburgh Ordnance District for the "Black Panther" and the 14-ton, 8-in. howitzer on wheels, maximum range 10 miles.

Cannon derives from "kanna," Greek for tube, literally a hollow reed, like bamboo.

Drenching the enemy with big shells to save American lives was theme of a demonstration-conference Army Ordnance Chiefs recently held with other shell manufacturers at McKeesport (Pa.) Works of Jones & Laughlin Steel Corporation. Led by Maj. Gen. Levin H. Campbell, Chief of Ordnance, and Brig. Gen. R. E. Hardy, Chief, Ammunition Branch, the party inspected plant where bomb line was converted to artillery 8-in. shell line (see illustration) in record time.

Propaganda shot to enemy in howitzer shells is working to break Axis morale, the army reports. 105mm shells, (over 3 million produced in J&L McKeesport Works), are timed to burst over enemy territory, scattering printed leaflets telling truth about war. They are well received, prisoners report.

Gun barrel got its name from 14th century Flemish weapons made of iron strips fashioned into long tubes and bound by hoops, like wine casks or barrels.

First gun using powder was built in Flanders about 1314. Called "fire pot," it was shaped like a vase, shot heavy, 4-sided, iron-headed arrows, was fired by wary gunner with lighted taper, who touched priming powder—and ran.

Gunpowder not Chinese invention, in opinion of many historians. Some give credit now to Roger Bacon, English author and alchemist (1214-1292).

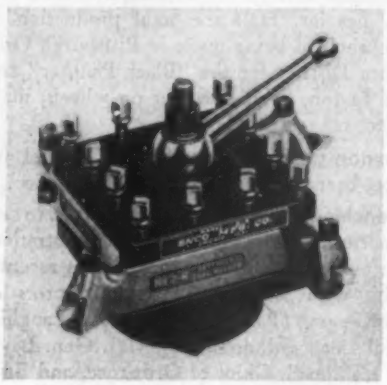
First shell forgings for this war made on an upsetter were produced by J&L Aliquippa Works in 1940 for British 6-inch shell. Using peace-time machinery without conversion, these forgings effected a substantial saving of steel. Aliquippa and Pittsburgh Works of J&L, as well as McKeesport Works, are furnishing great quantities of bomb casings, shell blanks and fragmentation bombs.

"He shall flee from the iron weapon and the bow of steel shall strike him through" (Job, 20, Oxford Bible) is one of few references in Scriptures to these metals applied to weapons of war. This prediction of startling timeliness foretells that: "The triumphing of the wicked is short. Though his height mount up to the heavens and his head reach into the clouds, yet he shall perish forever. And the earth shall rise up against him."

ENCO Manufacturing's Six-Inch Square Turret Tool Post

ENCO Manufacturing Co., Dept. 52, Chicago, Ill., announces the new 6 in. square turret tool post for use on lathes with 16 in. swing and larger lathes.

The turret block is designed to



ENCO square turret tool post

mount up to 1¼ in. tool bits or No. 2 tool holders for ⅜ in. square bits where additional flexibility in operation is required. The indexing mechanism, being self-contained, eliminates all chip interference and assures maintenance of an accurate setting in production.

DuPont Company Introduces Water Resisting Hand Cream

A new water-resisting hand protective cream for workers whose jobs bring them into contact with water-soluble oils, dilute acids alkalies and other water-chemical mixtures, is announced by the finishes division, E. I. duPont de Nemours and Co., Wilmington 98, Delaware.

Known as "Pro-Tek No. 2" hand-protective cream, it is intended for operations where water is present and the standard water-soluble "Pro-Tek" unsuitable. One application lasts from 3 to 4 hours and may be removed by using an industrial hand cleanser or washing in hot water with a mild soap.

Gray-Mills Portable Coolant System and Centrifugal Pump

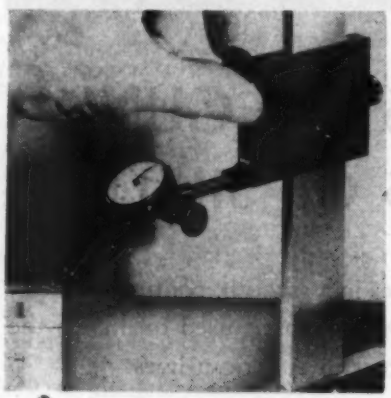
Model 1130, a new one in the line of coolant systems manufactured by Gray-Mills Co., 1948 Ridge Ave., Evanston, Ill., is announced as being particularly suited for the application of coolants to grinders, cut-off saws, milling machines and such op-

Gray-Mills portable coolant system

erations as fine abrasive cutting and honing. Flow is adjustable from a trickle to a full stream.

The 1130 unit is described as simple, compact, sturdy and easily portable. It is ready for immediate plug-in operation and fits snugly under a machine or in any out-of-the-way place. Forced-settling baffle plates are built into the tank to reduce circulation of solids.

The pump has a capacity of 1,200 g.p.h. (water) at 0 head; 360 g.p.h. at 5 ft. head. Motor is 1/15 hp., with sealed bearings.



Federal Testmaster height gage

Federal Fine Adjustment Height Gage is Announced

Federal Products Corporation, 1144 Eddy St., Providence 1, R. I., has ready for sale a new fine adjustment height gage, model 1492.

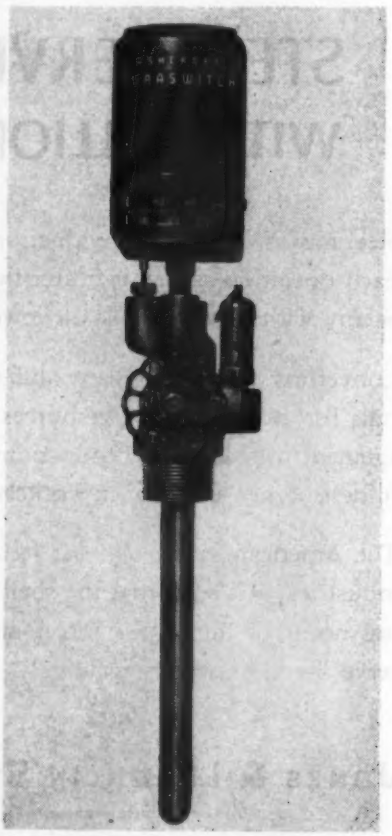
A complete set includes the Federal Testmaster indicator, the fine adjustment bracket and the 18 in. stand, packed in a wooden case.

Specifications include: Model 1 testmaster: graduated 0.001 in.; dial, 0-15-0; range, 0.030 in.; Model 2 testmaster: graduated, 0.0001 in.; dial, 0-4-0; range, 0.008 in. Specifications common to each model: contact point, 0.100 in. dia.; fine adjustment range, 0.030 in.; maximum vertical capacity, 18.; upright, 1¼ × ¼ × 20 in.; mounting stud, 0.219 in. dia.; max. distance, contact point to upright, 4½ in.; base, ground and lapped, 5⅜ × 2¼ × ⅞ in. high. Weighs, with indicator, 3½ lb.

Ashcroft Compressor-Trol Guides Compressor Operation

The Ashcroft Compressor-Trol, announced by The Electro-Mechanical Division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., combines seven devices for the control of compressor operation into a single compact unit. It is said to eliminate the necessity of using pipe and pipe fittings, simplifying installation and reducing the possibility of air leakage.

It is made in ½, ¾ and 1¼ in. sizes for selection according to the inlet connection. It is designed to cover all requirements of tank mounted compressors up to 15 hp. or 60 cu. ft. per min. It is equipped with the Ashcroft Duraswitch, with either an electric or mechanical attachment for operating the two-way unloading valve mounted on the casting.



Ashcroft Compressor-Trol

Because nothing rolls like a ball . . . .

The Steel Ball, precision-ground and lapped to within five *one-hundred thousandths* of an inch of perfection in diameter, or even closer, is the heart of the New Departure Ball Bearing. Sphericity is within *10 millionths of an inch!*

In the New Departure plants, where millions of balls are made daily, precision limits are a routine matter. In fact, this is one of the finest examples of precision manufacture in all industry.

It can well be said that our way of life *depends* on the ball bearing—for most every mechanical device known to man, somewhere, somehow, has ball bearings in its family tree.

New Departure's experience, resources for research, imagination and advanced techniques have produced a truly fine ball bearing.

So . . . when next you buy or build some mechanical device, ask: "Has it New Departure Ball Bearings?"

3321

Cut-away view of New Departure Ball Bearing

nothing rolls like a ball

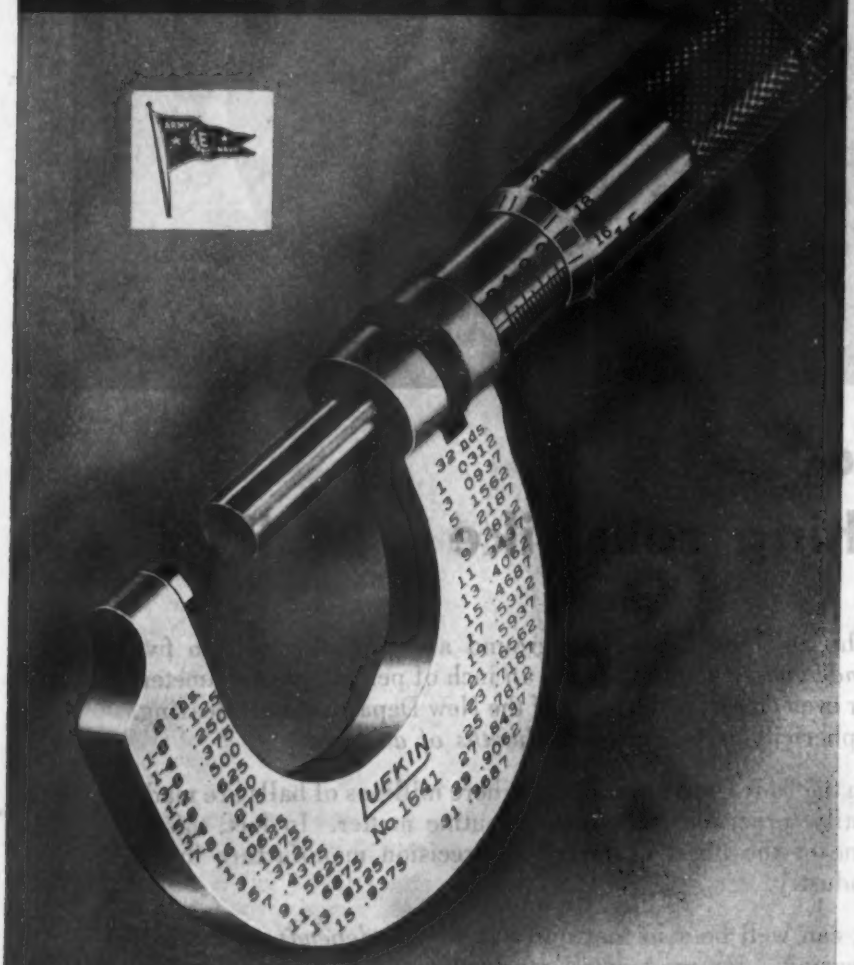
NEW DEPARTURE

BALL BEARINGS

NEW DEPARTURE • DIVISION OF GENERAL MOTORS CORPORATION • BRISTOL, CONNECTICUT

Sales Branches: DETROIT, G. M. Bldg., *Trinity 2-4700* • CHICAGO, 230 N. Michigan Ave., *State 5454* • LOS ANGELES, 5035 Gifford Ave., *Kimball 7161*

LUFKIN MICROMETERS



Good tool men the country over appreciate the accuracy and reliability of Lufkin Micrometer Calipers. Lufkin "mikes" are the ideal tool for accurately checking machined parts in which close tolerances are required. Because of their sturdy construction they stand up well under constant use. Because of their design they are easy to adjust and easy to read.

Write for complete catalog 12-c.

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TAPES · RULES · PRECISION TOOLS

TRADE PUBLICATIONS

BORING TOOLS The Eastern Tool Co., East Hartford 8, Conn., has issued a circular on precision carbide boring tools and standard carbide gages. The various models are illustrated and their dimensions and prices given.

COMPARATOR CHARTS American National Form and British Standard Whitworth Screw-Thread Comparator Charts are presented in a book of the same title by the Engineers Specialties Div. of the Universal Engraving and Colorplate Co., 980 Ellicott St., Buffalo 8, N. Y. These charts are used in conjunction with optical comparators and projectors in place of permanent screens for checking thread shapes of all sizes and pitches and for both coarse and fine thread series.

COUPLINGS The Philadelphia Gear Works, Inc., Philadelphia 34, Pa., has released Bulletin 150 on its line of couplings. This 16-page illustrated book contains complete information on the features, uses, dimensions, ratings and prices of such types as steel flanged couplings, flexible couplings, Philflex Oldham type, thermoid type, "CW" resilient couplings, Poole type and many others.

DRILL ADAPTOR How to get additional use from flute ends of broken twist drills is explained with drawings and photographs in a folder presenting a new tool, the Zephyr collet chuck drill adaptor, manufactured by the Zephyr Mfg. Co., Inglewood, Cal. Illustrations show how broken flute ends can be kept on the job by rough grinding a simple flat notch on the side of the broken drill end.

DUST COLLECTOR A catalog of individual type self-contained Dustkop dust collectors for collecting dust from all sizes of surface, tool, pedestal, disc grinders and sanders is now available from Aget-Detroit Co., 602 First National Bldg., Ann Arbor, Mich. Dimensions and specifications are included as well as accessories required for installation and the prices for the complete unit.

ENGRAVING The George Gorton Machine Co. of Racine, Wis., has announced two bulletins, Form 1580-B and Form 1635-B. The former booklet contains 20 pages of information on the complete line of Pantograph engraving machines, while the latter presents eight pages of data on the line of tracer-controlled electric arc etchers, single or multiple head for light or deep etching of all kinds of metal.

FLY CUTTER The Newfield universal fly cutter, which is adaptable for machining plastics, light and heavy metals, is described in a bulletin available from the Newfield Machined Parts Co.,

7160 Melrose Ave., Los Angeles 46, Cal. Illustrations show how the machine can be used for slotting, cutting a radius, form milling, straddle milling and surface milling, and a table of specifications gives dimensions of size, bore, toolbit size, width and number of bits.

HARD-FACING A pamphlet entitled "Cut Costs with Haynes Stellite Hard-Facing Rods" is available from Haynes Stellite Co., Kokomo, Ind. The booklet explains the advantages of protecting wearing parts by hard-facing with Haynes Stellite alloy, lists typical parts that can be hard-faced in various industries, and illustrates the different parts.

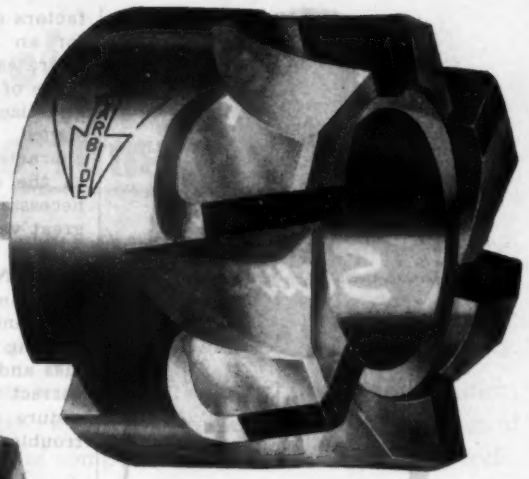
MEASURING The technical aspects of the Profilometer as an electronic measuring instrument are discussed in Supplement No. 1 offered by Physicists Research Co., Ann Arbor, Mich. Although devoted mainly to the development and technical side of the Profilometer, a section of the book describes the company's entire line of equipment.

PAINTS The Quigley Co., 527 Fifth Avenue, New York 17, N. Y., has released a set of literature consisting of Triple-A Catalog, color chart and bulletins on its complete line of aluminum, marine, dairy white and mill white protective coatings. Each of these high heat resisting paints are described in detail, and applications and color samples included.

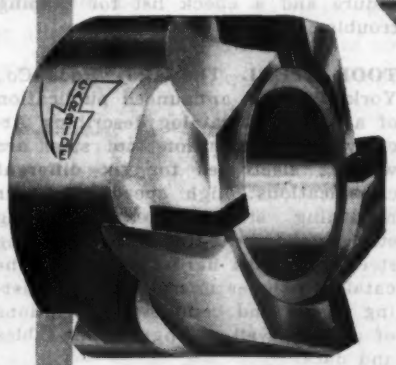
REDUCTION UNITS The Cleveland Worm and Gear Co., Cleveland, Ohio, has available a four-page, illustrated bulletin which embodies a concise description of the new Speedaire fan cooled worm gear reduction units. The bulletin points out that because of the more effective removal of heat, the Speedaire unit delivers up to twice the h.p. capacity obtainable from standard type worm reducers of equal size, when operated at the usual motor speeds.

RUBBER PRODUCTS Prepared especially for designers of industrial equipment as well as consumer products, the B. F. Goodrich Co., Akron, Ohio, has issued a general booklet on its line of industrial rubber products. The booklet includes information on the company's line of Vibro-Insulators, devices of rubber and metal which reduce vibration, rubber lined tanks and valves, products made with Koroseal, a material created from plasticized polyvinyl chloride, V-belts and cements, and molded extruded, lathe cut and sponge rubber products.

SPRINGS To emphasize the importance of correct spring design, the Muehlhausen Spring Corp., Logansport, Ind., has prepared an 8-page booklet entitled "Springs Designed for the Job Improve Product Performance." This booklet describes the



No. SSM Shell End Mills, for machining steel. Standard sizes from 1¼" to 6" diameters, 4 to 10 teeth.



No. SEM Shell End Mills, for machining cast iron and non-ferrous materials. Standard sizes from 1¼" to 6" diameters, 4 to 8 teeth.

Boost output

AS MUCH AS

10 times

. . . with these new

STANDARD CARBIDE TIPPED

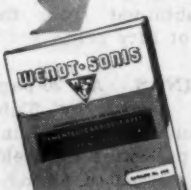
SHELL END MILLS

UP TO 10 TIMES greater output and 4 times longer life between sharpenings, are not unusual with these new Wendt-Sonis Carbide Tipped Shell End Mills that employ a negative rake design feature. Consider these desirable advantages:

1. 20" feed compared to a 2" feed of HSS end mill
2. Increased surface feet per minute
3. 25% longer carbide tips
4. Faster, cleaner cutting . . . finer finishes

Carbide Tipped Tools are a specialty with us. We make them exclusively. Our experience, research, development and improvements are your assurance of complete satisfaction when you use W-S Carbide Tipped Tools.

Refer to "TOOLS" in your Classified Telephone Directory, for your nearest W-S Distributor, or write WENDT-SONIS COMPANY, HANNIBAL, MISSOURI. Branch Warehouse: LONG BEACH, CALIFORNIA.



NEW! **CATALOG 144** just off the press. Contains data and latest prices on W-S Shell End Mills plus many standardized carbide-tipped tools formerly classed as "special." WRITE TODAY for your FREE copy.

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CARBIDE TIPPED CUTTING TOOLS

BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS • CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS • TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER TURNING TOOLS • ROUTER BITS • SPECIAL TOOLS

CAPEWELL
Contour Saws
SAVE TIME & MONEY BECAUSE
HARDER BACK
which absorbs the strain of contour sawing

Furnished in tangle-proof package
CAPEWELL
HACK SAW BLADES
the molybdenum high speed hack saw blade
THE CAPEWELL MFG. CO.
Hartford, 2, Conn.

factors essential to designing a spring for an application correctly and illustrates and describes the five basic types of springs and the many shapes and sizes into which they may be designed. Spring materials and their characteristics are discussed as well as the specialized equipment that is necessary to produce efficiently the great variety of spring designs.

TAPPING Henry P. Boggis & Co., Cleveland 13, Ohio, is offering Shop Reference List No. 15—an analysis of tapping troubles with suggested remedies and tap information. Included are correct tap terms, tap sharpening procedure and a check list for tapping troubles.

TOOL STEEL The Alloy Rods Co., York, Pa., has announced publication of a tool steel catalog describing Arcaloy's new extrusion tool steel arc welding electrodes for six different classifications: high speed steel, air hardening steel, water hardening steel, oil hardening steel, hot working steel, and work hardening steel. The catalog includes microphotos, tempering charts and complete descriptions of uses as well as engineering tables and data.

TOOLING A brochure entitled "Precision Lofting" has been issued by the Template Reproduction Co., 401 N. Broad St., Philadelphia 8, Pa. It gives management, engineering, tooling and production executives an insight into the new industrial "lofting" method for producing, with accurate templets, a variety of products ranging from automobiles, aircraft and household appliances, to small components of every description. Basically, the method involves the mechanical reproduction of full-size detail drawings directly on tooling materials.

TURRET LATHES The Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio, has published a booklet entitled "How to Machine Parts on the Turret Lathe," its latest development in the company's training program. Each step in the tooling of any turret lathe job has been reduced to a simple explanation easily understood by the most inexperienced operator, and illustrations, photographs and diagrams are used to further clarify the tooling problem being discussed. Copies may be obtained from the company at a cost of fifty cents.

WELDING FITTINGS A 20-page booklet has been issued by Tube Turns, Inc., of Louisville, Ky., giving allowable working pressures for welding fittings in five classes of piping—power, oil, district heating, gas and air, and refrigeration. Fourteen convenient tables list allowable pressures at the indicated temperatures for any size and weight Tube-Turn fitting. All tabulations are made in accordance with the Code for Pressure Piping A.S.A. B31.1-1942.

INDEX VERTICAL MILLS FOR THE TOOL ROOM OR PRODUCTION LINE
Milling, Drilling or Boring. Verniers or Rods and Indicators for locating. Ask the shop that has one. Better still, ask the shop that has an Index and also another of competitive make.

Mfd. by Index Machine & Tool Co.
PROMPT DELIVERY!
12" Tool Room Rotary Table
Mfd. by Index Machine & Tool Co.

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.
For use on Index Mills or any other machine that will accommodate a 12" table.
BLANK and BUXTON MACHINERY
3100 E. MICHIGAN AVE.
JACKSON, MICH.

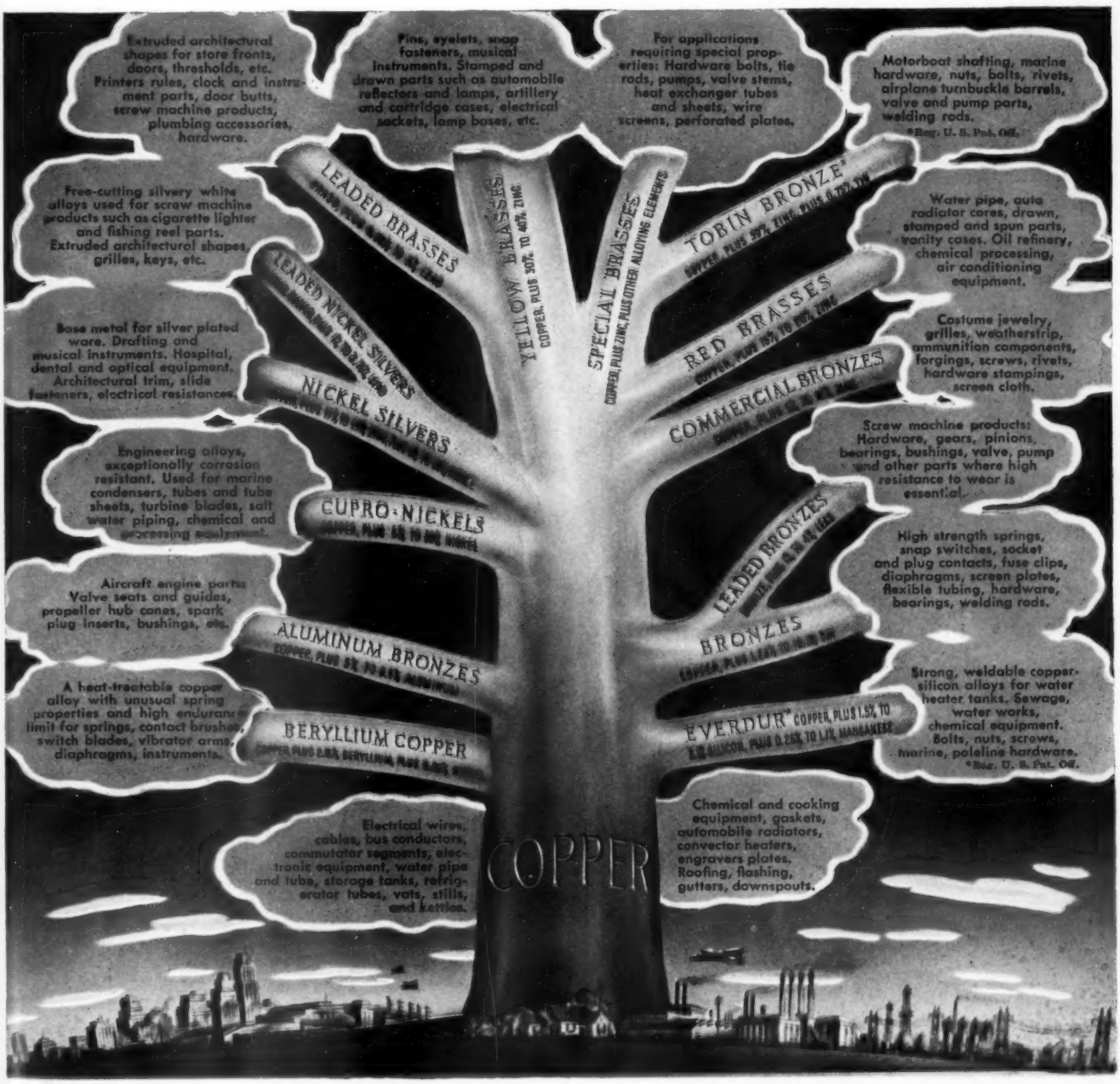
Copper is the trunk of an indispensable family tree

THE COPPER family of alloys is versatile, indeed. These dependable metals have contributed to the development of practically all technical and industrial progress. Other metals may have more distinctive properties. Chromium is harder; magnesium is lighter; silver has higher conductivity. But . . . of all commercial metals, copper and its alloys *combine to best advantage* a range of physical and chemical properties not found in any other group.

These properties include a high degree of corrosion resistance; high tensile strength and fatigue resistance; ductility; hardness; toughness; ready weldability; resistance to abrasion; hot or cold workability; machinability, and high thermal and electrical conductivity.

Yet, these very properties, singly or in combination, can be varied to a considerable extent by metallurgical adjustment of composition and by changes in the technique of fabrication. When it is considered that Anaconda Products are made not only of copper, but of copper alloyed with zinc, tin, nickel, lead, aluminum,

(continued on next page)


Extruded architectural shapes for store fronts, doors, thresholds, etc. Printers rules, clock and instrument parts, door butts, screw machine products, plumbing accessories, hardware.
Pins, eyelets, snap fasteners, musical instruments. Stamped and drawn parts such as automobile reflectors and lamps, artillery and cartridge cases, electrical sockets, lamp bases, etc.
For applications requiring special properties: Hardware bolts, tie rods, pumps, valve stems, heat exchanger tubes and sheets, wire screens, perforated plates.
Motorboat shafting, marine hardware, nuts, bolts, rivets, airplane turnbuckle barrels, valve and pump parts, welding rods.
*Reg. U. S. Pat. Off.
Free-cutting silvery white alloys used for screw machine products such as cigarette lighter and fishing reel parts. Extruded architectural shapes, grilles, keys, etc.
LEADED BRASSES
YELLOW BRASSES
COPPER, PLUS 30% TO 40% ZINC
SPECIAL BRASSES
COPPER, PLUS ZINC, PLUS OTHER ALLOYING ELEMENTS
TOBIN BRONZE*
COPPER PLUS 39% ZINC PLUS 0.75% TIN
Water pipe, auto radiator cores, drawn, stamped and spun parts, vanity cases. Oil refinery, chemical processing, air conditioning equipment.
LEADED NICKEL SILVERS
RED BRASSES
Base metal for silver plated ware. Drafting and musical instruments. Hospital, dental and optical equipment. Architectural trim, slide fasteners, electrical resistances.
NICKEL SILVERS
COMMERCIAL BRONZES
Costume jewelry, grilles, weatherstrip, ammunition components, forgings, screws, rivets, hardware stampings, screen cloth.
Engineering alloys, exceptionally corrosion resistant. Used for marine condensers, tubes and tube sheets, turbine blades, salt water piping, chemical and processing equipment.
CUPRO-NICKELS
Screw machine products: Hardware, gears, pinions, bearings, bushings, valve, pump and other parts where high resistance to wear is essential.
LEADED BRONZES
High strength springs, snap switches, socket and plug contacts, fuse clips, diaphragms, screen plates, flexible tubing, hardware, bearings, welding rods.
Aircraft engine parts: Valve seats and guides, propeller hub cones, spark plug inserts, bushings, etc.
ALUMINUM BRONZES
BRONZES
A heat-treatable copper alloy with unusual spring properties and high endurance limit for springs, contact brushes, switch blades, vibrator arms, diaphragms, instruments.
BERYLLIUM COPPER
EVERDUR* COPPER, PLUS 1.5% TO 3.5% SILICON, PLUS 0.25% TO 1.5% MANGANESE
Strong, weldable copper-silicon alloys for water heater tanks. Sewage, water works, chemical equipment. Bolts, nuts, screws, marine, poleline hardware.
*Reg. U. S. Pat. Off.
Electrical wires, cables, bus conductors, commutator segments, electronic equipment, water pipe and tube, storage tanks, refrigerator tubes, vats, stills, and kettles.
COPPER
Chemical and cooking equipment, gaskets, automobile radiators, convector heaters, engravers plates. Roofing, flashing, gutters, downspouts.

ANACONDA
from mine to consumer

Anaconda Copper & Copper Alloys

The Scope of

(continued from preceding page)

manganese, silicon, beryllium, chromium and other elements, and that each alloy is produced in a wide variety of commercial sizes and shapes, the need for strict laboratory control of all materials and every step of production becomes readily evident.

2,506,329 Laboratory Tests made in 1943

The scope of routine laboratory control over all mill operations and practices can be gaged by the number of tests made during 1943 in the laboratories of The American Brass Company—2,506,329. This includes tension and bend tests, conductivity or resistance tests, examinations under the chemical and metallurgical microscopes, and chemical and spectrographic determinations.

Examining a spectrum plate. The presence or absence of various elements is determined by matching a master plate with the unknown spectrum. Semi-quantitative analysis can be made by comparing the relative intensity of element lines in the sample spectrum with those in exposures of standard samples made on the same plate.

CHEMICAL AND METALLOGRAPHIC LABORATORIES

A. Electrolysis is utilized for the accurate and rapid determination of copper and certain other elements in copper alloys. In this apparatus, platinum anodes are mechanically rotated. The exact weight of copper after deposition and drying is quickly indicated by the latest type Projection Reading Analytical Balance. Determinations of copper and lead contents, for instance, can be made in less than an hour. **B.** The American Brass Company pioneered in its field in the use of colorimetric methods of analysis. The Photo-Electric Colorimeter illustrated accurately determines amounts of certain constituents of copper base alloys—in minutes, instead of hours formerly required by the usual wet methods of analysis. **C.** Control of grain structure is important in obtaining the required physical properties of copper alloys. Here, on the Grain Size Comparator, the diameter of average grain of a brass specimen is being determined by directly comparing the magnified image of the specimen with "transparencies" of known standards. **D.** The preparation of all types of specimens and the production of photomicrographs at medium and high magnifications require a high order of skill and experience in operating the metallographer's most useful tool —the Metallurgical Microscope. In technical circles an enviable reputation has been earned by The American Brass Company for the excellence of its photomicrographs.... But before microscopic examination can be made, the specimen must be carefully polished and etched to reveal the essential details. An electrolytic method of doing this had been brought to a high state of development by The American Brass Company, and routine use for a period of several years has proved its advantages over the slower method of mechanical polishing and chemical etching.

TECHNICAL CONTROL over Anaconda Alloys

Such extensive application to technical details—plus the craftsmanship inherent in more than a century of experience in the art of making brass—have led the way in producing Anaconda Alloys possessing unusual uniformity and dependability.

Foremost in Research

You would expect the largest fabricator of copper and copper alloys to be foremost in the search for greater metallurgical knowledge in that field:

As early as the turn of the century, The American Brass Company instituted routine laboratory control of alloy compositions, replacing the father-to-son methods of mixture determination which up to then had prevailed throughout the Industry.

In 1902, the trend toward more accurate control of grain size and structure was initiated through the use of the metallurgical microscope.

In 1914, a large quartz spectrograph was installed, the first in this country to be used for metallurgical research and qualitative analysis of alloys.

The Research Department of The American Brass Company has produced and tested thousands of copper base alloys, many of which are now in common use for special types of service, providing higher strength, greater workability, and better corrosion resistance than ever before available.

It has often combined in one alloy the specific properties of several others, providing an opportu-

(continued on next page)

E F G

RESEARCH AND SPECTROGRAPHIC LABORATORIES

Operations performed in the spectrographic analysis of metals are of three types: Qualitative—in which the identity of the elements alloyed to form the sample is established; Quantitative—in which the presence of certain elements is confirmed and the amount of each measured precisely; or Semi-Quantitative — in which certain elements are identified and the amounts estimated by comparison with standards representing the specification limits. **E.** In this quartz prism spectrograph, radiation from the arc passes through the slit and is dispersed by the large quartz prism to form on the photographic plate an image of the slit for every wave length present in the arc. Each element "writes its signature" on the plate—positive proof that the element responsible for those lines is present in the sample. **F.** Rather than by a prism, dispersion of the radiation passing through the slit on this grating-type Spectrograph is obtained by a diffraction grating ruled on a concave mirror. The spectral lines characteristic of each element vary in intensity in proportion to the amount of the element present in the sample. **G.** This Densitometer-Comparator is being used for examination of spectra taken on the grating-type Spectrograph. A magnified image of the spectrum appears on the screen, and is compared with a master plate imaged on the lower third of the screen. **H.** This X-ray Diffraction Unit has a wide variety of research applications: Determinations of the amount and type of preferred orientation; identification of phases, and determination of their lattice parameters are a few. Certain mill operations also are brought under more rigorous control with its aid.

H

Made by The American Brass Company

PLANNED RESEARCH is finding the answers to many metal problems

(continued from preceding page)

nity for manufacturers to reduce production costs, simplify tooling requirements, and increase the serviceability and value of their product.

It has developed mill procedures to facilitate production and assure quality.

It has developed readily weldable copper base alloys, welding rods, and procedures for their use—making possible the economical use of strong, corrosion resistant, lightweight assemblies where more cumbersome castings of rustable metals were formerly employed.

Answers to other metal problems have been found in the development of strong, ductile, workable alloys of brass, bronze or nickel silver—with composition, temper and grain size adjusted to provide the best combination of characteristics for operations such as spinning, stamping, cupping, forming, deep drawing or machining. Resulting economies include longer life for dies and cutting tools, greater uniformity of parts, product improvement, and a lower over-all manufacturing cost.

The goal of this painstaking laboratory control and planned research program is that the Anaconda Copper or Copper Alloys you select will fully meet your manufacturing requirements and the service standards of your product—that they will be moderate in price, economical to use, and wholly adequate to your needs.

The Technical Department of The American Brass Company will be glad to work with you in selecting the best metal for a specific application.

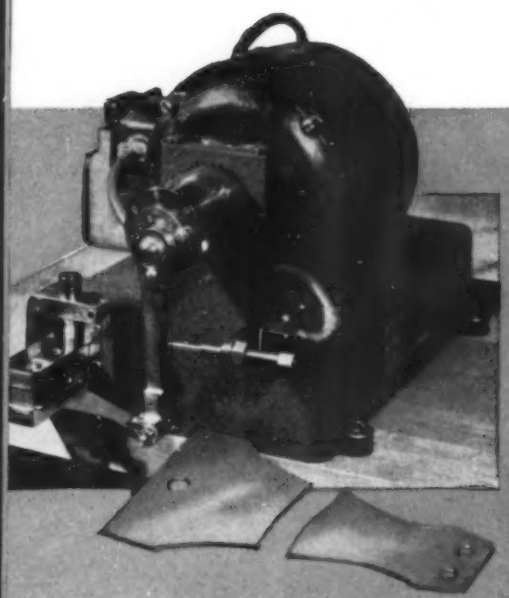
ANACONDA from mine to consumer

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut • Subsidiary of Anaconda Copper Mining Company

In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ontario*

44118

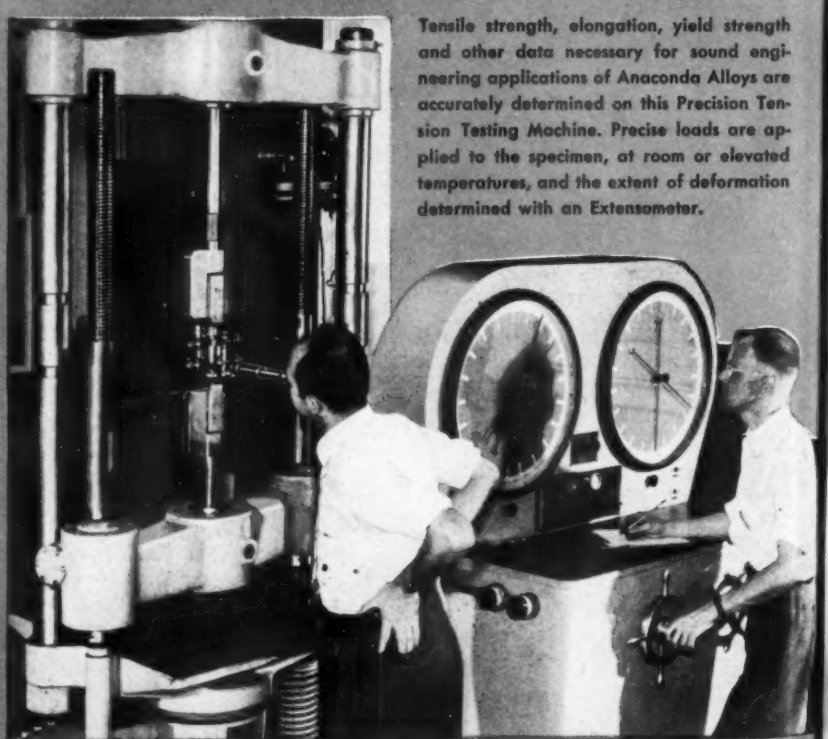


TESTED TO DESTRUCTION—

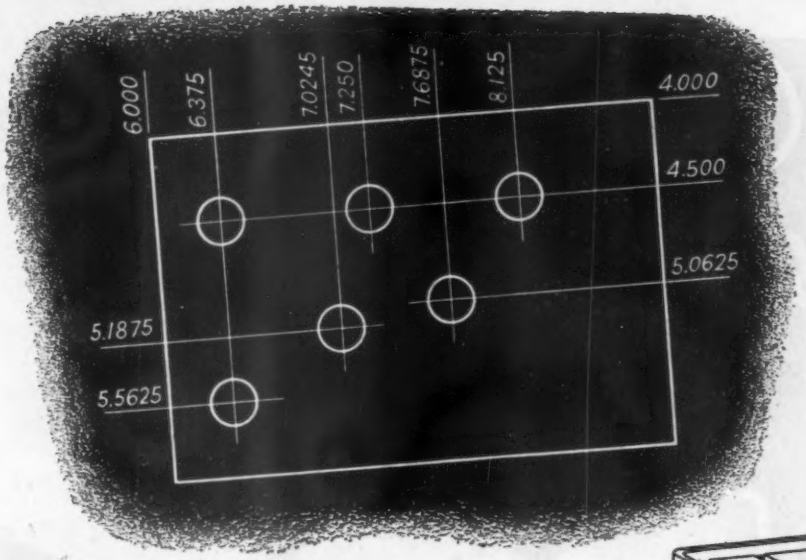
—so that Anaconda Metals in service may have longer life. Performance of Anaconda Alloys in simulated service is constantly checked in the Testing Laboratories. This broken phosphor bronze strip fatigue specimen withstood approximately 50,000,000 cycles of reversed stress, on the Fatigue Machine illustrated, at a deflection corresponding to an initial stress of 25,000 lb. per sq. in. before failure occurred.

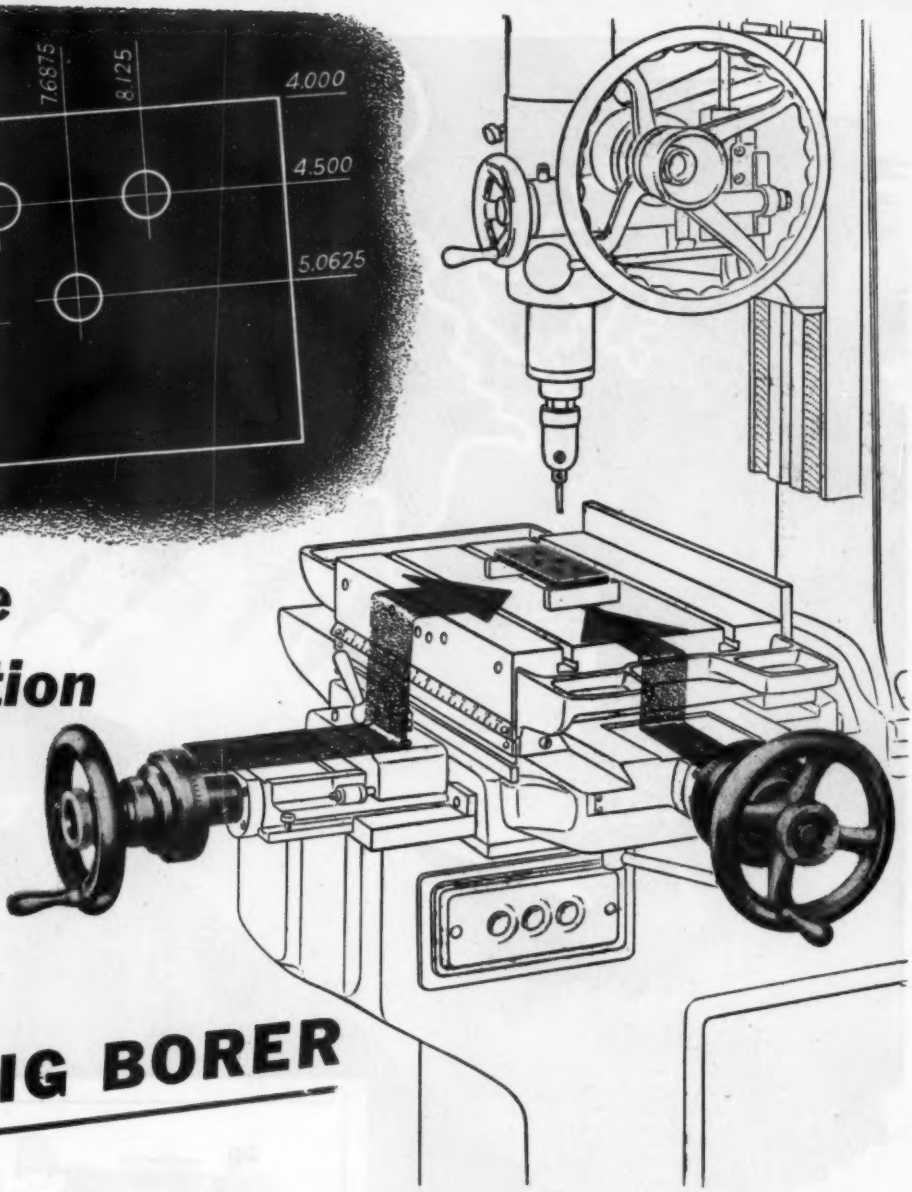
SECTION OF PHYSICAL TESTING LABORATORY

Tensile strength, elongation, yield strength and other data necessary for sound engineering applications of Anaconda Alloys are accurately determined on this Precision Tension Testing Machine. Precise loads are applied to the specimen, at room or elevated temperatures, and the extent of deformation determined with an Extensometer.



Anaconda Copper & Copper Alloys





Coordinate Hole Location is at your Fingertips in the MOORE JIG BORER

SPOTS • DRILLS • BORES • REAMS
***All* Holes with Minimum Tool Changes**

A glance at your blueprint...a few turns of the lead screws and *all* holes on the work piece are quickly located and spotted—*consecutively, accurately*. It's as simple as that. There's no waiting for tool changeover on each individual hole, for the Moore Jig Borer drills, bores and reams *all* holes in the same rapid sequence with the minimum of tool changes.

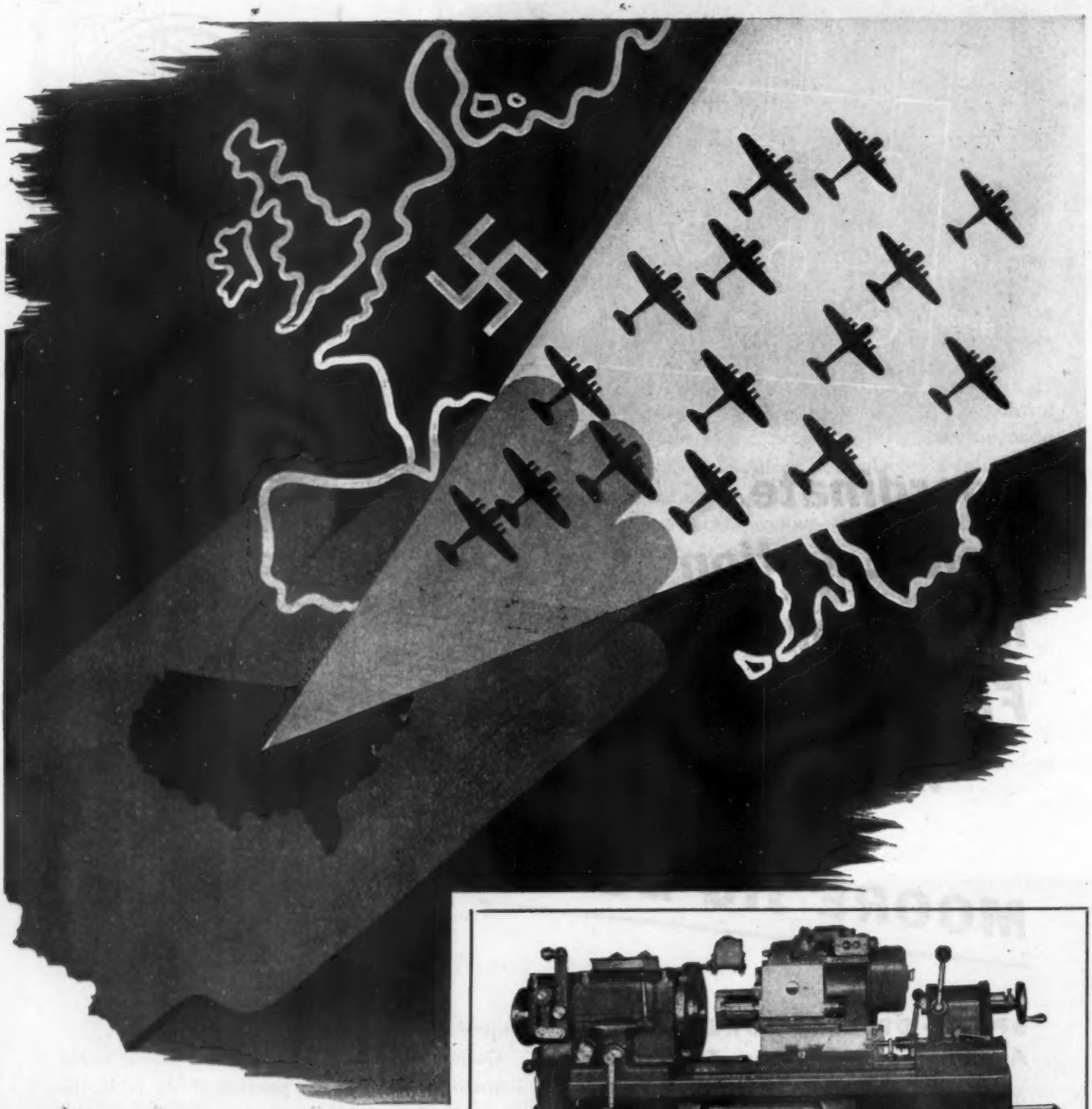
Contrast this *built-in* system of coordinate location with the laborious size blocks or graduated scale methods of measurement, plus the continual stop-and-start required with tool changes at every hole. Then compare its production volume on your cost sheets.

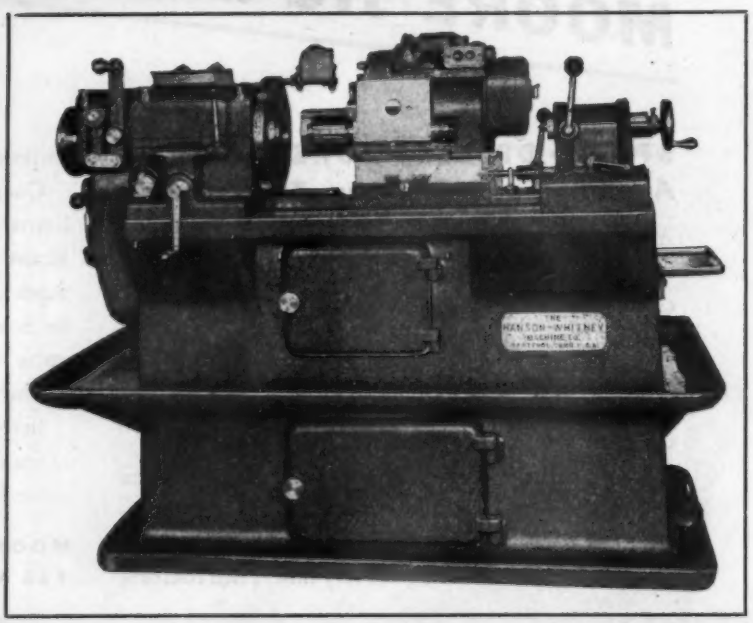
Guaranteed to space and bore holes accurately within limits of .00025" in *any* position of the table, the Moore Jig Borer is ideally suited for jigs, fixtures, dies, gages and special machine parts. It is highly sensitive for holes of 1/32" diameter yet rugged for heavy cuts up to 4½"—and is ideally suited for jig-less, small-lot production.

Investigate the advantages of the Moore Jig Borer in your applications. See it in operation at our plant or write for our descriptive literature.

MOORE SPECIAL TOOL COMPANY, INC.
738 Union Avenue, Bridgeport 7, Conn.

MOORE JIG BORER





Go Ahead Signal

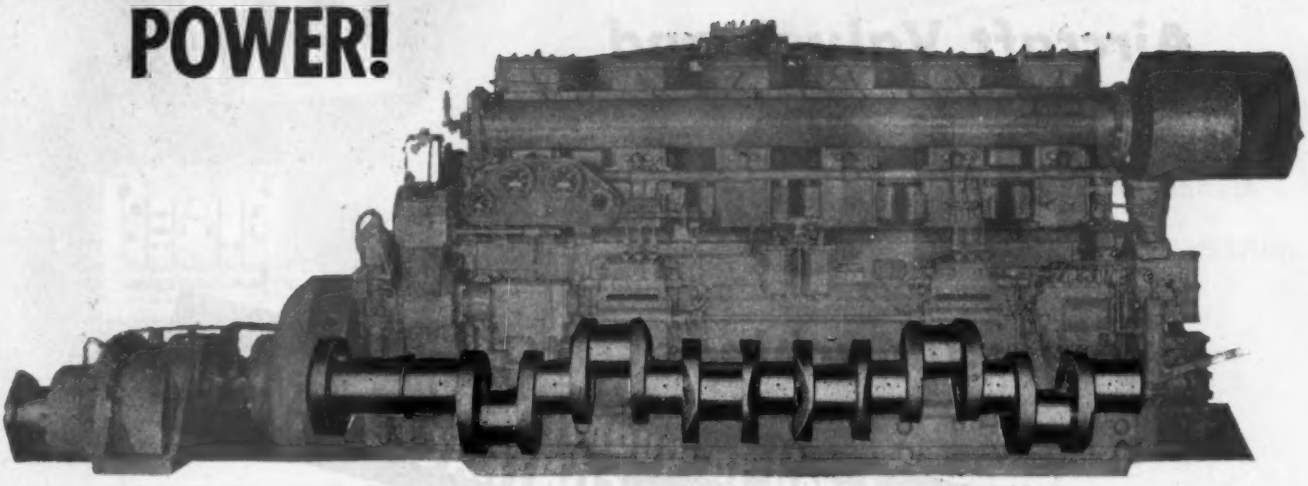
H-W Semi-Automatic Thread Milling Machines employ multiple cutters that finish threads in one revolution . . . producing internal, external or taper threads . . . right or left hand . . . with equal speed, facility and precision. We'd like to tell you about them. Give us the "go ahead signal" with a letter or wire.

ARMY E NAVY

THE HANSON WHITNEY MACHINE CO.

HARTFORD CONNECTICUT U.S.A

DEPENDABLE POWER!



MEEHANITE CRANKSHAFTS

COOPER-BESSEMER ENGINES

Hundreds of these cast Meehanite crankshafts in Cooper-Bessemer gas and Diesel engines are now in service. Acknowledged leaders in Diesel engine design and construction, Cooper-Bessemer Corporation engineers have found that the Meehanite crankshafts permit:

1 **Design to better engineering principles**
2 **Better stress distribution**
3 **Higher vibration absorption**
4 **Adequate tensile, torsional and fatigue strength**

Utilizing the dependable mechanical properties of Meehanite for other parts, Cooper-Bessemer engines contain several hundred Meehanite Castings as units of construction.

These and the other superior properties of Meehanite Castings are being utilized daily in practically every industry where castings are used. If you are planning a new product or redesigning your present ones, consult a Meehanite foundry.

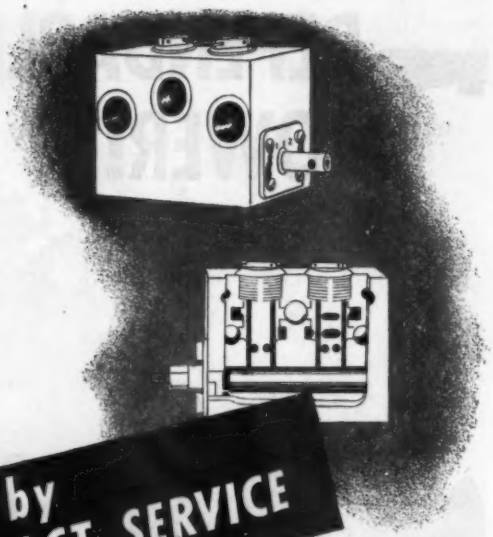
MEEHANITE FOUNDRIES

Allentown, Pa.	Tinytor Engineering Company
Ansonia, Conn.	Farrel-Birmingham Co., Inc.
Birmingham, Ala.	The Continental Gin Co.
Bridgewater, Mass.	The Henry Perkins Co.
Brooklyn, New York	E. W. Bliss Company
Buffalo, N. Y.	Pohlman Foundry Co., Inc.
Charleston, W. Va.	Kanawha Manufacturing Co.
Chattanooga, Tenn.	Ross-Meehan Foundries
Chicago, Ill.	Bronzoe Foundry Company
Cincinnati, Ohio	Cincinnati Grinders Incorporated
Cincinnati, Ohio	The Cincinnati Milling Machine Co.
Cleveland, Ohio	Fulton Foundry & Machine Co.
Denver, Colo.	The Stearns-Roger Mfg. Co.
Detroit, Mich.	Atlas Foundry Co.
Flint, Mich.	General Foundry & Mfg. Co.
Hamilton, Ohio	The Hamilton Foundry & Machine Co.
Hamilton, Ontario	Otis-Fensom Elevator Co., Ltd.
Irvington, N. J.	Barnett Foundry & Machine Co.
Jeannette, Pa.	Elliott Company
Los Angeles, Calif.	Kinney Iron Works
Milwaukee, Wis.	Koehring Company
Mt. Vernon, O., Grove City, Pa.	Cooper-Bessemer Corporation
New York, N. Y., Mahwah, N. J.	The American Brake Shoe Co.
Oakland, Calif.	Vulcan Foundry Company
Orillia, Ontario	E. Long, Ltd.
Philadelphia, Pa.	R. W. Butterworth & Sons Co.
Philadelphia, Pa.	Florence Pipe Foundry & Machine Co. (E. D. Wood Company, Selling Agents)
Phillipsburg, N. J.	Warren Foundry & Pipe Corp.
Pittsburgh, Pa.	Rossdale Foundry & Machine Co.
Portland, Oregon	Crawford & Doherty Foundry Co.
Rochester, N. Y.	American Laundry Machinery Co.
St. Louis, Mo.	Banner Iron Works
St. Paul, Minn.	Valley Iron Works
Seattle, Washington	Washington Iron Works
Spokane, Washington	Washington Machinery & Supply Co.

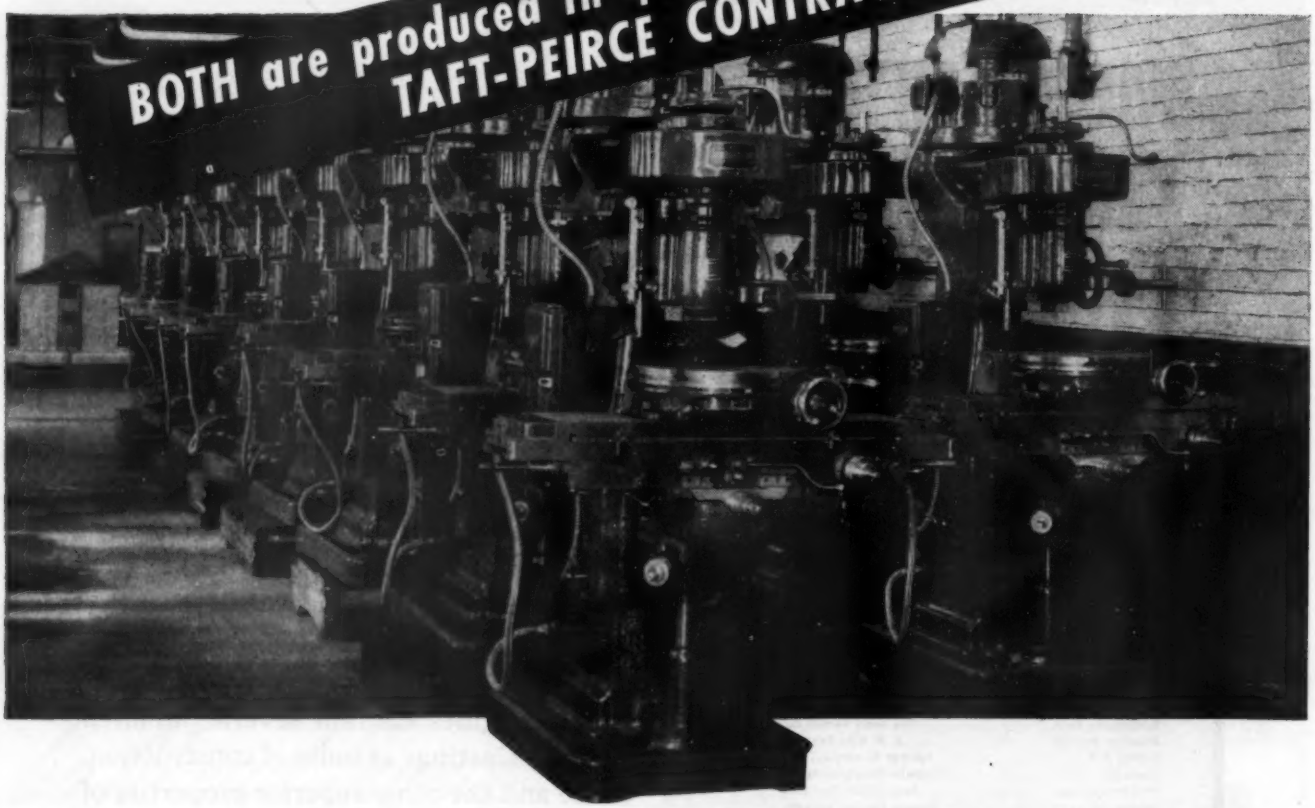
MEEHANITE QUALITY CONTROL ASSURES UNIFORM DEPENDABILITY

MEEHANITE RESEARCH INSTITUTE
NEW ROCHELLE, N. Y.

SMALL
Aircraft Valves and
BIG
Milling Machines



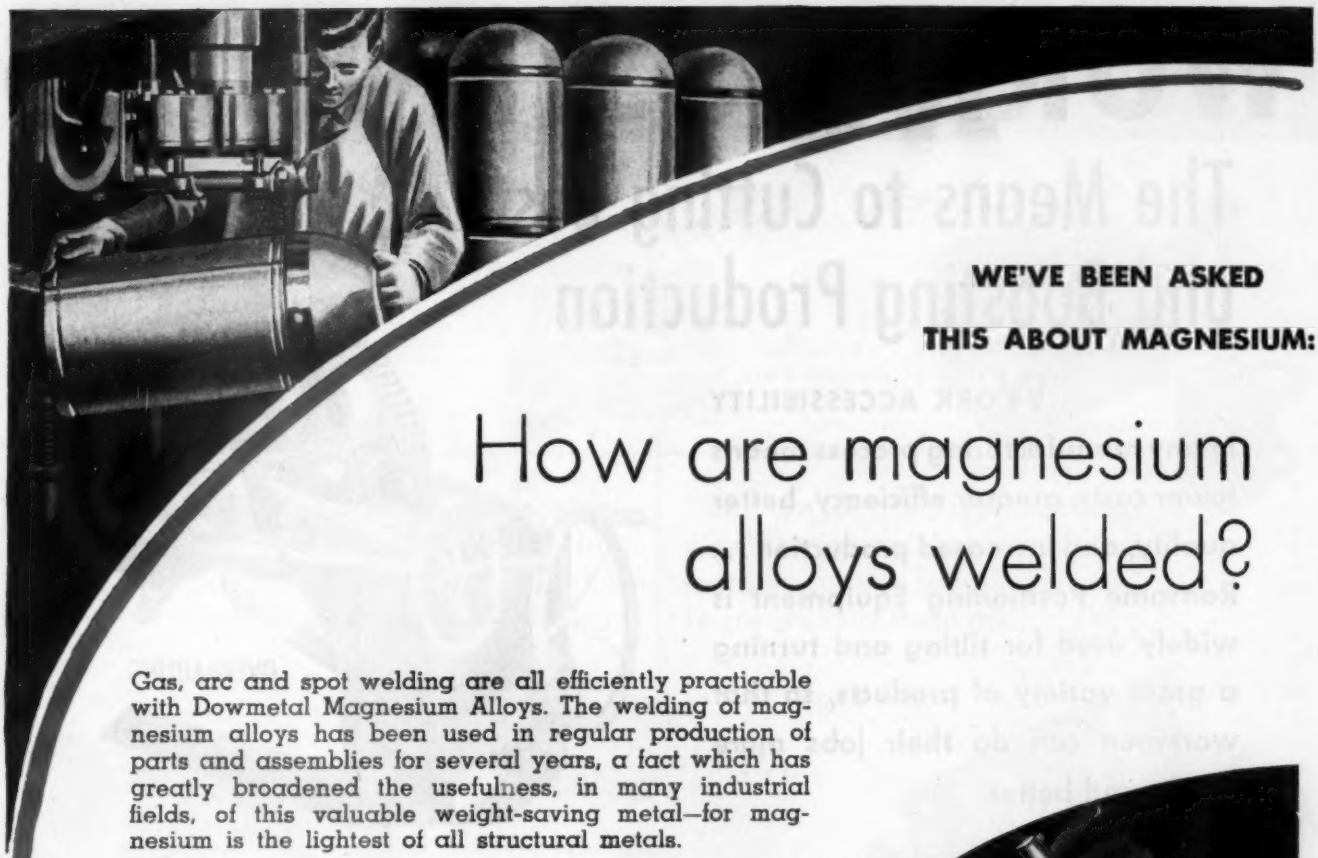
BOTH are produced in quantity by TAFT-PEIRCE CONTRACT SERVICE



No job is too big and none is too small, either in scope or quantity, for the Taft-Peirce Contract Manufacturing Division. Whether it be an aircraft hydraulic control valve of 37 parts, the assembly measuring no more than 6" x 4" x 2", or a No. 3 vertical milling machine, like these shown completed on our assembly floor, Taft-Peirce Contract Service can tool and produce a single part of either of them, or the complete unit in whatever quantities may be desired. In either case, production is exactly uniform—shipment by shipment—in accordance with the customer's specifications. Yet there is nothing extraordinary about either of these jobs, *as far as Taft-Peirce is concerned.* For the Taft-Peirce Contract Division has had over half a century of comprehensive experience, serving manufacturers in every field of industry throughout the world. You can get a clear idea of how this unique service can fit into your own production picture, simply by writing on your letterhead for the picture-and-caption book titled: "Take It to Taft-Peirce." *The Taft-Peirce Mfg. Co., Woonsocket, Rhode Island.*

FOR DESIGN, DEVELOPMENT, TOOLING, CONTRACT MANUFACTURING

Take It to Taft-Peirce

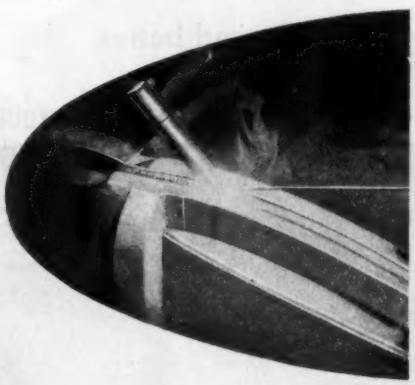


WE'VE BEEN ASKED

THIS ABOUT MAGNESIUM:

How are magnesium alloys welded?

Gas, arc and spot welding are all efficiently practicable with Dowmetal Magnesium Alloys. The welding of magnesium alloys has been used in regular production of parts and assemblies for several years, a fact which has greatly broadened the usefulness, in many industrial fields, of this valuable weight-saving metal—for magnesium is the lightest of all structural metals.



Any good welder can join magnesium alloys as readily as he can other metals. *Gas welding* is well adapted to the making of butt welds; fluxes are available for this type of weld. In *arc welding* (illustrated at the right) a tungsten electrode is used, and the weld area is shielded from air by a screen of inert gas, such as helium or argon, thus eliminating the need of fluxes. Lap, butt, edge and fillet welds can be made by this method. Magnesium alloys can readily be *spot welded* to each other. Less current density is required because of the lower electrical conductivity of magnesium alloys in comparison with aluminum. Clean metal and clean electrodes will insure a better spot weld.

The comprehensive facilities of Dow's own fabrication shops, supplemented by the full experience and specialized knowledge which naturally accrue to the pioneer and leading producer of magnesium, are at your disposal. Inquiries regarding the welding of Dowmetal—to be done in your plant or by Dow—will receive prompt and thorough attention.

DOWMETAL *magnesium*

THE METAL OF MOTION

DOWMETAL

MAGNESIUM DIVISION • THE DOW CHEMICAL COMPANY

MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle

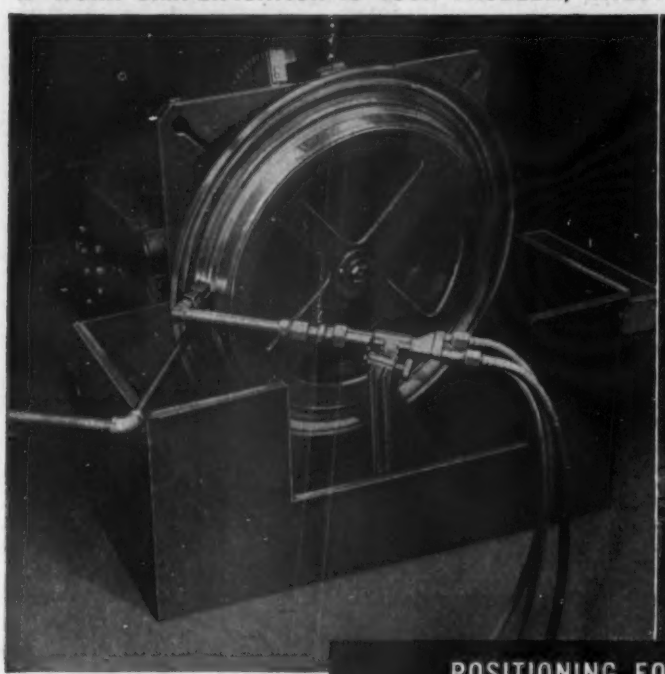
WORK POSITIONING

The Means to Cutting Costs and Boosting Production

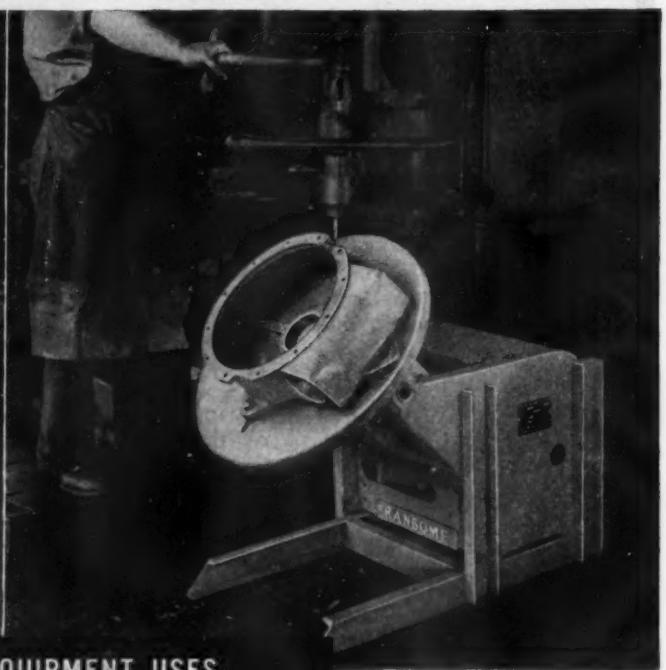
WORK ACCESSIBILITY in any manufacturing process means lower costs, greater efficiency, better quality, and increased production . . . Ransome Positioning Equipment is widely used for tilting and turning a great variety of products, so that workmen can do their jobs more easily and better.

OVERHAULING

IF WORK SIMPLIFICATION IS YOUR PROBLEM, INVESTIGATE THIS EQUIPMENT . . . IT WILL PAY DIVIDENDS



FLAME HARDENING



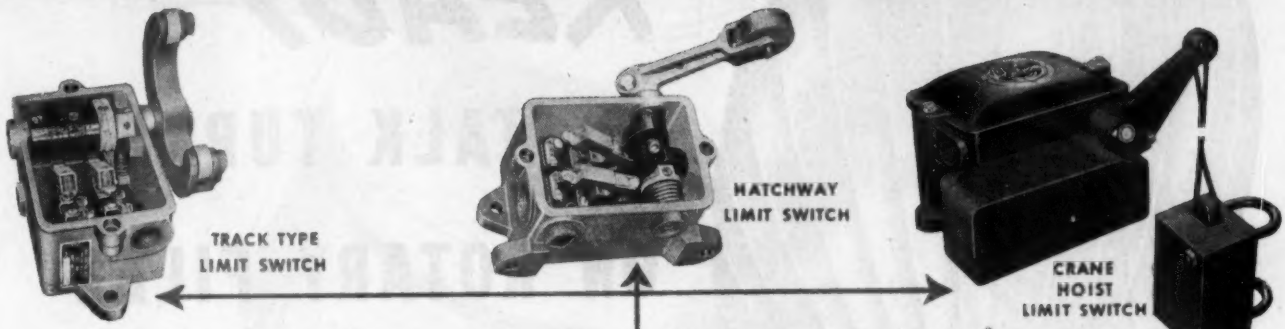
DRILLING

POSITIONING EQUIPMENT USES

Welding · Parts assembly · Drilling · Flame hardening
Flame cutting · Hard surfacing · Chipping · Grinding
Cutting · Overhauling · Burnishing · Polishing · Plating

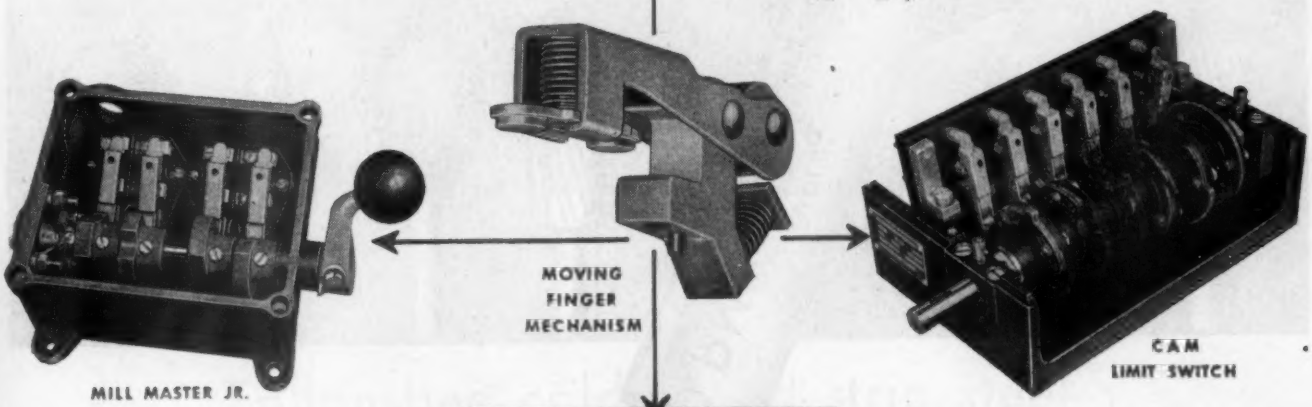
INDUSTRIAL DIVISION **Ransome MACHINERY COMPANY**
DUNELLEN, NEW JERSEY
SUBSIDIARY OF WORTHINGTON PUMP AND MACHINERY CORPORATION

ONE CONTACT FINGER ASSEMBLY FITS THEM ALL!



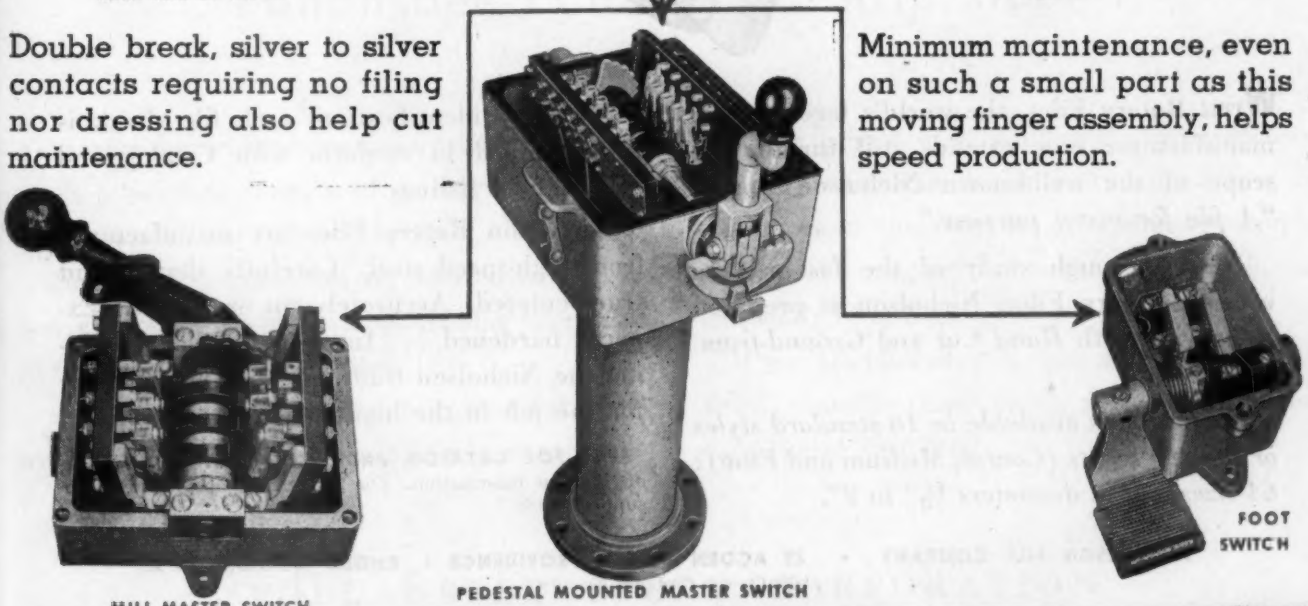
The moving finger mechanism pictured in the center of this page fits every one of the accessory switches shown.

Thus, in plants using several different types of these switches, maintenance is simplified. One spare part fits them all.



Double break, silver to silver contacts requiring no filing nor dressing also help cut maintenance.

Minimum maintenance, even on such a small part as this moving finger assembly, helps speed production.



CONTINUE TO ROLL WITH CLARK CONTROL

THE CLARK CONTROLLER CO.

1146 EAST 152ND ST. CLEVELAND, 10, OHIO

READY

TO "TALK TURKEY" ON ROTARY FILES

With Rotary Files, the world's foremost file manufacturer now extends still further the scope of the well-known Nicholson slogan, "*A file for every purpose.*"

After thorough study of the fast-growing uses of Rotary Files, Nicholson is prepared to provide both *Hand Cut* and *Ground-from-solid* types.

Each type is available in 16 standard styles or shapes; 3 cuts (Coarse, Medium and Fine); 64 sizes and in diameters 1/8" to 2".

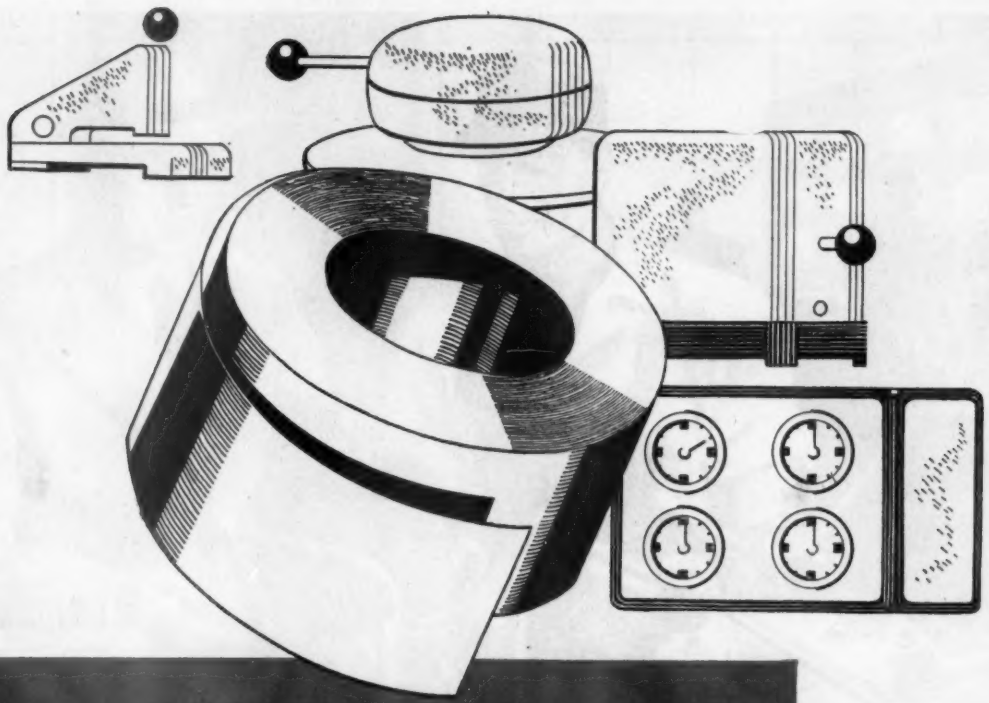
For easy identification, each file shank is code-stamped to conform with Catalog and Price Sheet listings.*

Nicholson Rotary Files are manufactured from high-speed steel. Carefully shaped and true centered. Accurately cut or ground. Expertly hardened. . . . In every respect, upholding the Nicholson tradition for *The right file for the job* in the highest quality obtainable.

***SEND FOR CATALOG AND PRICE LIST.** Write us for any special information. For deliveries, consult your mill-supply house.

NICHOLSON FILE COMPANY • 29 ACORN STREET, PROVIDENCE 1, RHODE ISLAND, U. S. A.
(Also Canadian Plant, Port Hope, Ont.)

NICHOLSON FILES FOR EVERY PURPOSE NICHOLSON USA



there are advantages

in specifying

Follansbee cold rolled strip steel

Follansbee's experience in making special, high quality steels presents advantages to the buyer of such a staple item as Cold Rolled Strip Steel.

First, your specifications are adhered to rigidly, and Follansbee meets the most exacting tolerances in thickness, width and camber.

Second, the services of Follansbee metallurgists are available—especially important when new products are being planned, or when difficulties are experienced in your present stamping or drawing operations.

And when you require extraordinary service, Follansbee's compact and flexible organization can frequently be of help.

If you are interested in these advantages, check with Follansbee when placing your next order for Cold Rolled Strip Steel.

FOLLANSBEE STEEL CORPORATION

GENERAL OFFICES • PITTSBURGH 30, PA.

Sales Offices—New York, Philadelphia, Rochester, Cleveland, Detroit, Milwaukee, *Sales Agents*—Chicago, Indianapolis, St. Louis, Nashville, Los Angeles, San Francisco, Seattle; Toronto and Montreal, Canada
Plants—Follansbee, W. Va. and Toronto, O.

ALLOY BLOOMS & BILLETS, SHEETS & STRIP • • • COLD ROLLED CARBON SHEETS & STRIP
POLISHED BLUE SHEETS • ELECTRICAL SHEETS & STRIP • SEAMLESS TERNE ROLL ROOFING

NICKEL AIDS THE MACHINE TOOL INDUSTRY

to KEEP 'EM WORKING!

Everyone marvels at the speed of American production for war . . .

But how many realize that much of the credit should go to machine tool designers?

They are the ones who created the *tools* for doing the job.

They're making production miracles commonplace . . . with the most efficient machine tools that ever whipped raw material into finished product.

And the secret? For one thing, they try to design each component part of a machine so that it outlasts the machine itself.

They know that failure of a single machine in a mass production setup might bring whole assembly lines to a stop.

So they lean heavily on Nickel alloyed materials for the critical parts of machine tools.

Over the years they have learned that Nickel contributes toughness, strength, and fatigue resistance . . . properties vitally essential to many different kinds of tool parts . . . from grinder frames to tail shafts, from gears and spindles to drill chucks and lathe beds.

In the industries which use machine tools, it's an axiom that "a little Nickel goes a long way" to keep 'em working.

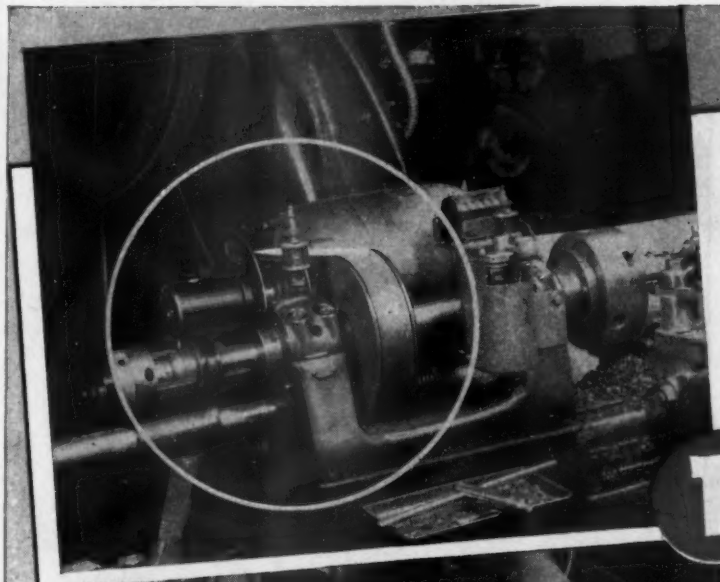
Whatever *your* industry may be . . . if you want help in the selection, fabrication, and heat treatment of alloys . . . we offer you counsel and data.

New Catalog Index

New Catalog C makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects—from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?

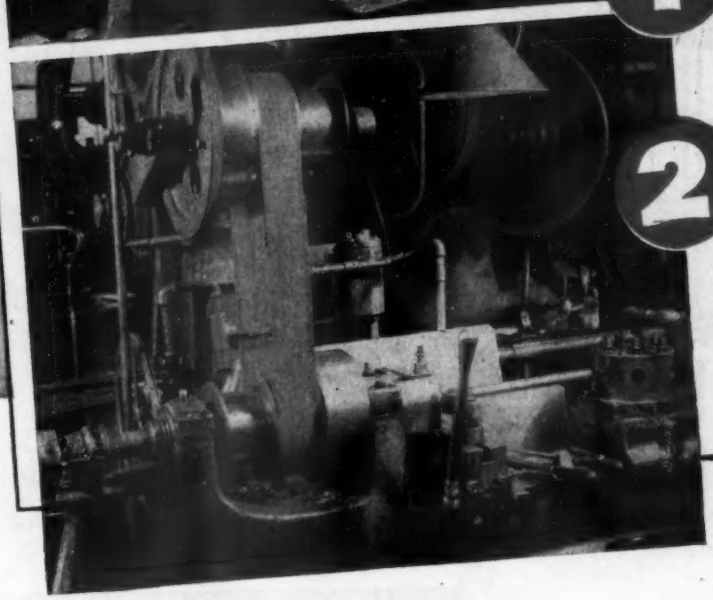
★ Nickel ★

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York 5, N. Y.*



Case History OF TWO MACHINES

1 with REEVES SPEED CONTROL



2 without SPEED CONTROL

Here are two hand screw machines, both doing the same types of work—yet one is much more versatile, much more capable of accurate, speedy production than the other. One is equipped with a compact REEVES Vari-Speed Motor Pulley, permitting operation at any speed desired—at turn of handwheel, to meet requirements of different kinds and sizes of stock, different operations, etc. With the other the turning speed is *fixed* at a definite number of revolutions per minute —changeable only, *in steps*, by shifting belt from one pair of pulleys to another.

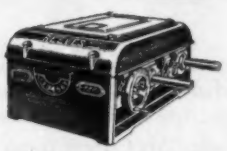
The second machine was later equipped with a REEVES Vari-Speed Motor Pulley for complete flexibility.

The advantages of REEVES Variable Speed Control, on all types of production machines, are universally recognized. Not so well known, however, is the ease and facility with which standard REEVES units can be installed on machines in service. Since these units are made in many sizes of three different designs there is usually no difficulty in selecting and installing the correct unit, at minimum cost, and with a minimum requirement of time.

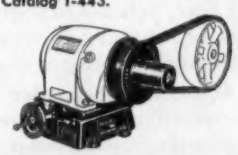
There's a REEVES Speed Control engineer near you, to help solve your installation problem. Write us.

REEVES PULLEY COMPANY • *Dept. A* • **COLUMBUS, INDIANA**

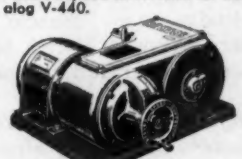
The 3 Basic Units in the REEVES LINE



Variable Speed Transmission for providing infinite, accurate speed flexibility over wide range. Send for Catalog T-443.



Vari-Speed Motor Pulley converts any standard constant speed motor to a variable speed drive. Send for Catalog V-440.



Motodrive combines motor, speed varying mechanism and reduction gears in single compact unit. Send for Catalog M-441.

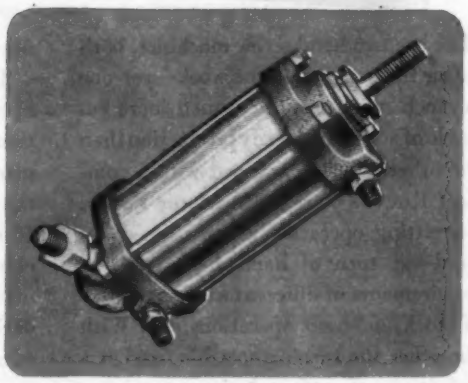
REEVES *Accurate Variable* Speed Control

Air, controlled and at work puts the "sock" in a windsock. Compressed air, Schrader-controlled, puts a "sock" into industrial operations, makes shorter, easier, safer work of them.

Schrader Air Controls cut costs, save time and labor by reducing or eliminating tiring and hazardous muscular operations. Using thrifty controlled intermittent air blasts instead of wasteful continuous flow, Schrader controls also enable you to enjoy the advantages of Schrader devices without—in many cases—adding to your existing compressor capacity.

The first cost of Schrader Air Controls and devices is so small and the return on the investment so consistently high that you can hardly afford to risk a return to reconversion production schedules and costs without serious consideration of them.

A highly practical example of Schrader air devices is the Schrader Air Cylinder, an air "muscle" with a thousand uses. Schrader Air Cylinders do tough, tiring, lifting, lowering, pushing or pulling jobs better, faster and cheaper than they can be done manually.



THERE ARE HUNDREDS OF USES for Schrader Air Cylinders. Cost very little. Easy to install and operate with Schrader Control Valves. Many types, single or double-acting, and in a variety of lengths, diameters and mountings for every purpose.

Send for the new Air Cylinder Bulletin A-10A and see the many Cylinders, Operating Valves, etc., you can use to save the time and energy of your workers.

Air Valves 2, 3, 4-way • Blow Guns • Machine Operating Air Controls • Quick-acting Couplers • Safety Operating Controls • Air Ejection Sets • Hydraulic Gauges

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Schrader
REG. U.S. PAT. OFF.
CONTROLS THE AIR

A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Incorporated,* BROOKLYN, NEW YORK

ON THE FIGHTING FRONTS!
ON THE PRODUCTION LINES!

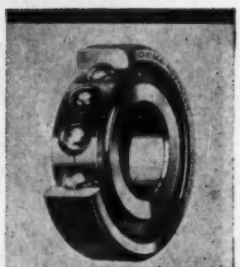
The PRECISION BEARINGS here pictured, together with many others from the comprehensive NORMA-HOFFMANN line, have literally "gone to war" for the Allied Nations.

On the fighting fronts, they are "in the service" in every type of naval craft, from patrol boat to battleship—in bombers, fighters, scout planes, trainers and transports—in guns, tanks, mobile artillery, military transport and supply equipment.

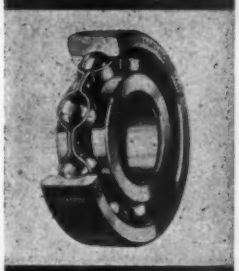
On the production lines, NORMA-HOFFMANN Bearings are in thousands of machines, machine tools, and other vital mill and shop equipment that are turning out ships, armament and indispensable war materials for the American and Allied forces.

Let our engineers work with you.

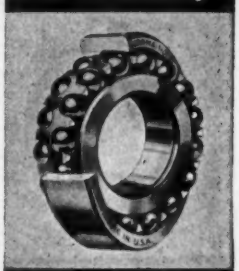
Separable (Magneto) Ball Bearing



Litro ("CL") Composition Retainer Ball Bearing

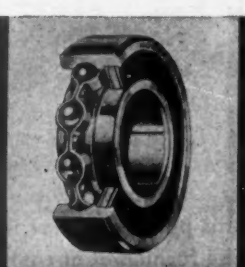


Single Row Ball Bearing

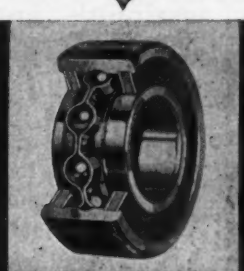


Double Row Self-Aligning Ball Bearing

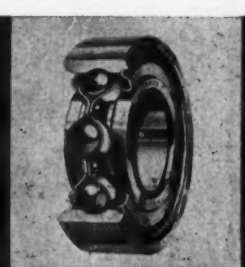
Shielded Type Single Row Ball Bearing



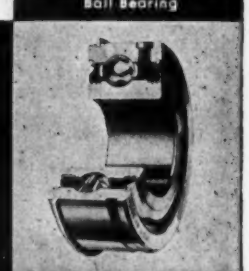
Single Felt Seal Ball Bearing



Double Felt Seal Ball Bearing

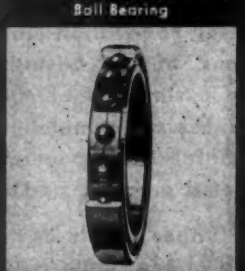


9000 Series (Feltless) Sealed Ball Bearing



"Cartridge" Fully Sealed, Refillable Type Ball Bearing

Double Row Ball Bearing



Extra Light Type Ball Bearing

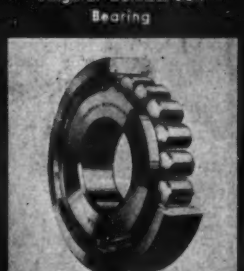
Angular Contact Ball Bearing

Extra Light Single Direction Ball Thrust Bearing

Single Direction Ball Thrust Bearing

Standard Cylindrical Roller Bearing

Type E Cylindrical Roller Bearing



Full Type (Retainerless) Cylindrical Roller Bearing

Extra Light Cylindrical Roller Bearing

Two-Lipped Cylindrical Roller Bearing

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FOR POST WAR SHEET STEEL COMPONENTS

Consult KIRK AND BLUM

Kirk & Blum offers you the facilities and professional "know how" of 37 years of Sheet Metal Fabrication.

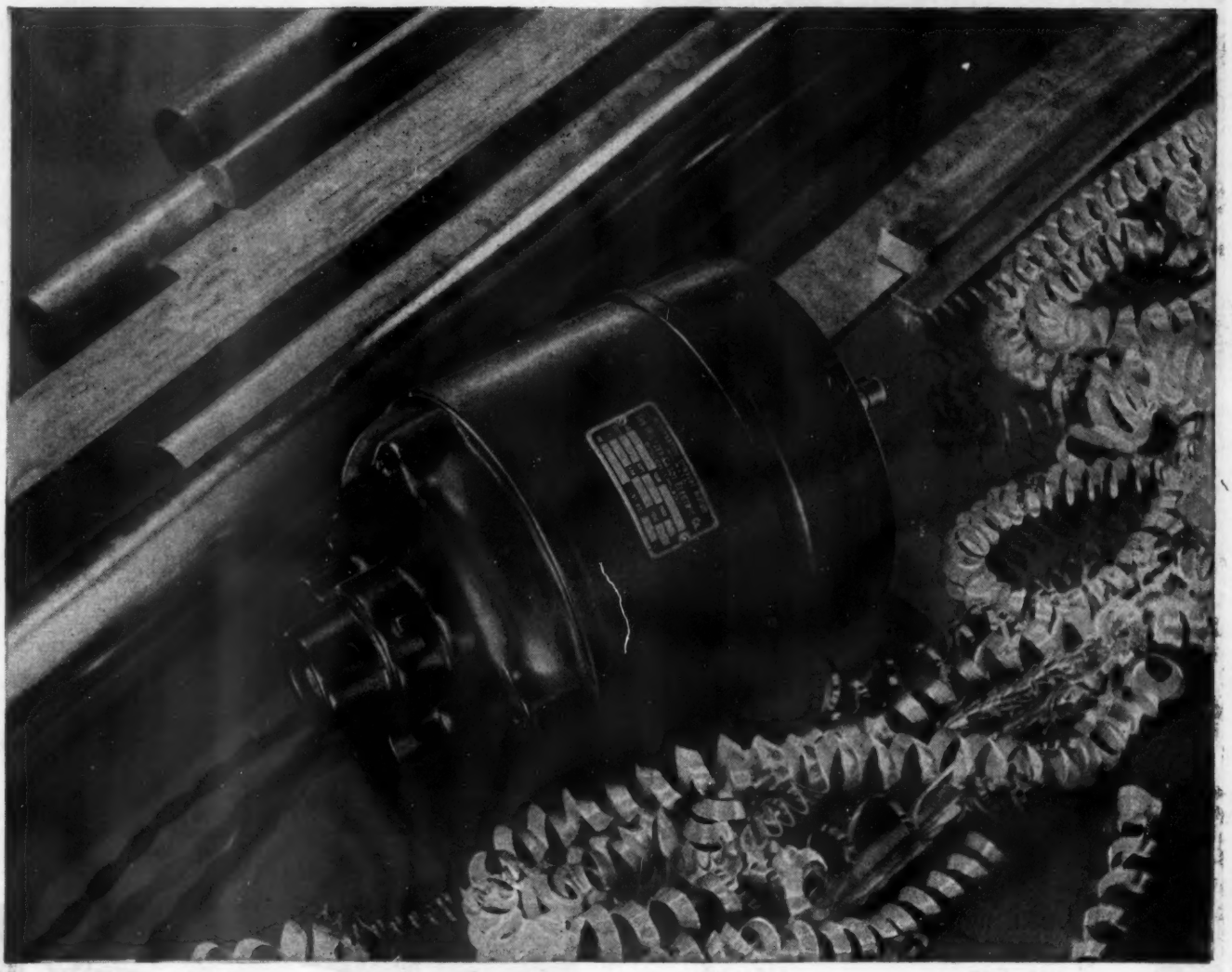
Our engineers will plan, design and give you preliminary estimates, without obligation on such sheet metal parts you feel may be needed. Samples will be furnished at cost if they can be readily produced by hand or with existing tools.

Sheet Metal Fabrication has long been an important part of our business. We specialize in parts and assemblies of sheet steel, alloy sheet and plate. We are completely equipped for welding and all fabricating operations and assembling of completed products and assemblies.

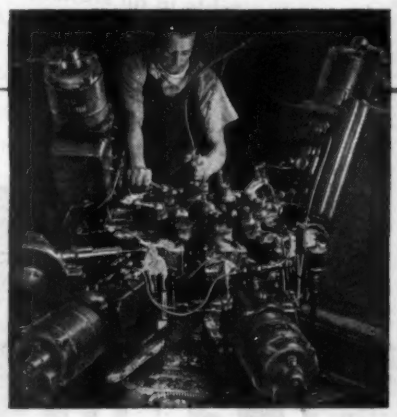
For further details of the K & B service outlined above, write now to The Kirk & Blum Manufacturing Co., 2823 Spring Grove Ave., Cincinnati 25, Ohio.

Our large and varied assortment of tools and dies may make it possible for you to produce needed articles with very little tool and die expenditure. We shall be glad to discuss this matter any time—just drop us a line.

KIRK AND BLUM



Meet Design and Performance Requirements in Machine Tools



The motor requirements for the precision machine tool, illustrated at the right, called for motors that met certain performance characteristics and special mechanical requirements.

Holtzer-Cabot motor development engineers solved the problem by designing a special motor that exactly met all the operating and design conditions . . . and today these machine tools are operating at peak efficiency because of the dependability of the motors.

Whether you build machine tools or cash registers, it will pay you to investigate Holtzer-Cabot special fractional HP motors.

Our engineers will gladly cooperate with you on your motor problems for post-war products. There is no obligation.

SPECIAL MOTORS DESIGNED TO FIT THE APPLICATION

HOLTZER-CABOT

Division of First Industrial Corporation

Designers and Builders of Special Fractional HP Motors and Electrical Apparatus

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For Carbide Tools

Resinoid bond diamond wheels for the grinding of carbide-tipped tools in large quantities or on a production basis. Their sharp, free-cutting action provides rapid stock removal, without appreciable wear. Also for fixed feed, precision grinding operations, such as cylindrical, surfacing, internal and cutter grinding.

Metal bond diamond wheels for off-hand grinding, where the cutting surface is sometimes subjected to extreme abrading action.

Available in all standard types and diameters, in diamond concentrations to meet your requirements.

Catalog on request.

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Look to —

MOTOR DRIVEN CENTRIFUGALS

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Deliveries are good on some styles

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SLEEVE TYPE BEARINGS

For your POSTWAR *Product*

The STRENGTH *of* STEEL
The BEARING QUALITIES *of* BRONZE

Pre-Cast Bearing

Bronze on Steel

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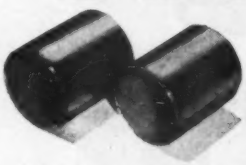

Available in a wide range of sizes as Sleeve Type Bearings or fabricated into washers, thrust plates, etc. Write for new literature.

Combining a high grade bearing bronze with strip steel provides a new and unusual bearing material. Its use as SLEEVE TYPE Bearings enables manufacturers to increase speeds and loads . . . to gain longer bearing life with smoother operation . . . plus greater resistance to shock and to wear. *Pre-Cast* Bearing BRONZE ON STEEL produces a thin wall, laminated type of bearing. The fabricating process, essentially a series of stamping and forming operations provides accuracy and precision at a low unit cost.

While Pre-Cast Bearing BRONZE ON STEEL was developed primarily for sleeve bearings it also serves many other important applications in industry. It is an excellent material for stampings, washers, guide strips, or other flat pieces. It is available in coils with a maximum width of 5½" and a range of thickness from 1/32" to 3/32".

A Johnson Engineer will gladly show you how you can use this new bearing material to advantage. There is one located near you. Why not call him in today?

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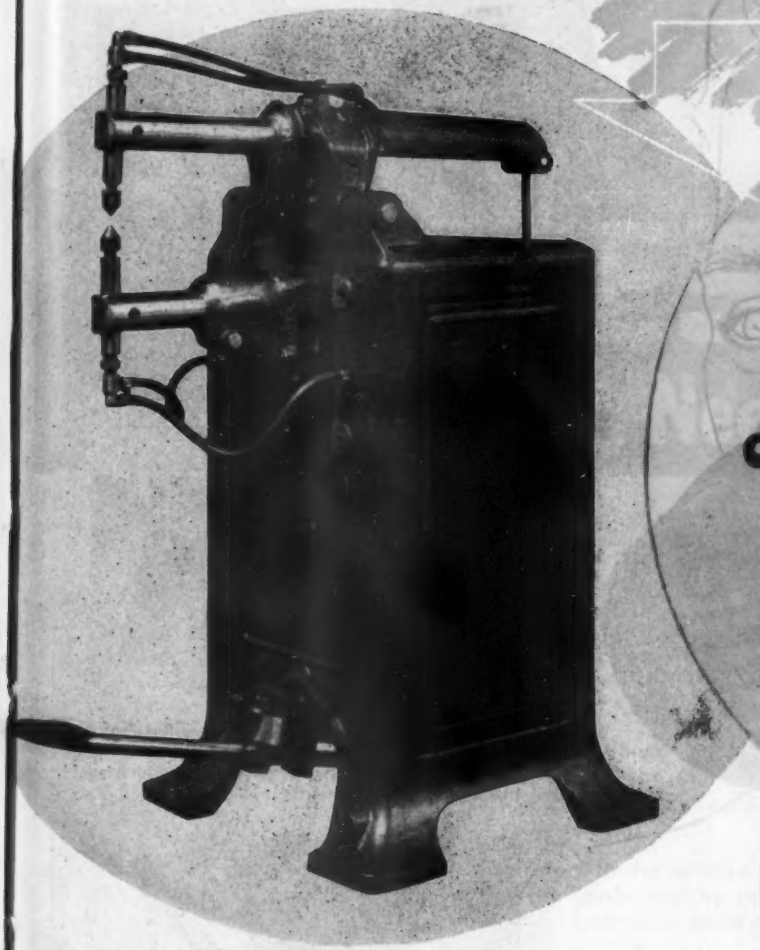
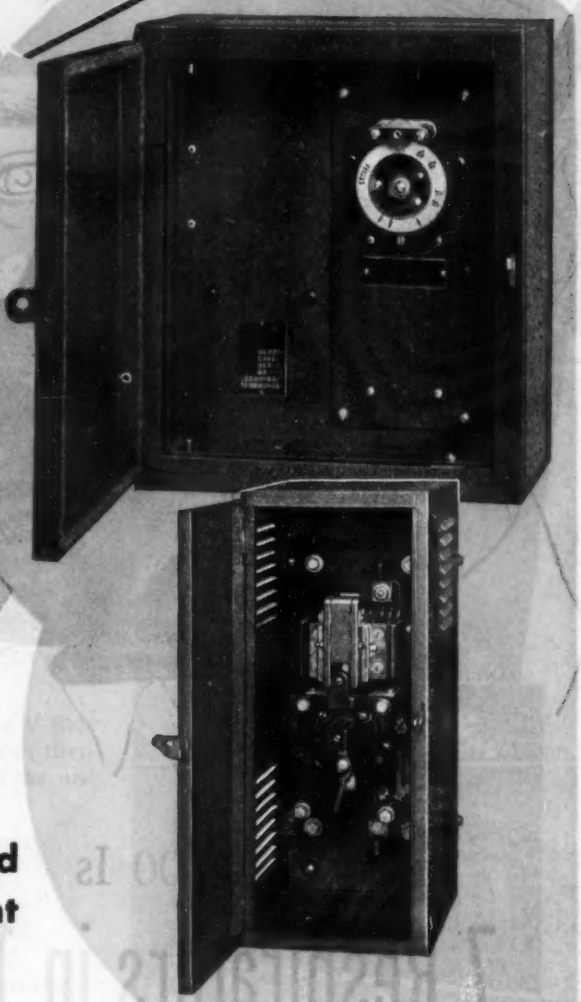
The quality of Circle B products begins in our own rolling mill.

How to modernize Spot Welders for as little as $105.00!





Safront Timer and High-Speed Contactor eliminate human element and assure *uniform* weld quality

Spoilage goes down and production goes up when welding power is controlled *automatically*. And it's a simple matter to equip machines, now in service, with modern timers and contactors for that purpose.

Your nearest Square D Field Engineer will be glad to check up on your present welding equipment. Quite often, such check-ups lead to substantial improvement in quality and output—at very little cost.

Top—**TYPE TBS-1 SAFRONT TIMER** automatically controls duration of welding current. All "live" parts are behind a protective panel. Timer adjustments can be made simply by turning the small knurled wheel on the panel front. Timer dial is calibrated 3 to 100 cycles.

Bottom—**HIGH-SPEED CONTACTOR** closes and opens the circuit to the primary of the resistance welding transformer. It is designed specifically for fast operation and heavy loads. Notice ample ventilation and generous wiring space. Knockouts for conduit entrance are provided in both top and bottom.

SQUARE D COMPANY

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AO's R-1000 Is

7 Respirators in 1

Equipped with this respirator, a worker can be protected on more than a hundred different jobs that may endanger his lungs. Seven types of cartridges—all interchangeable—provide true all-around protection.

No other respirator offers the comfort and convenience of AO's R-1000 . . . plus the economy of its 7-way interchangeability. For the full story of this respirator, and two other popular models, write for the new AO respirator folder. It also contains a helpful chart which recommends the proper respirator for 139 jobs that endanger the lungs.

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

Comfort & Safety Features

FITS ANY FACE Adaptability of the design, pliability of the rubber, and the smoothly rounded edges covered with a washable cotton facelet make it possible to fit this respirator to any face, safely and comfortably, without adjustment.

CHECK FOR PROPER FIT The R-1000 Respirator, fitted with any of the seven Dust or Chemical Cartridges, may be easily and quickly tested for positive fit on the wearer's face.

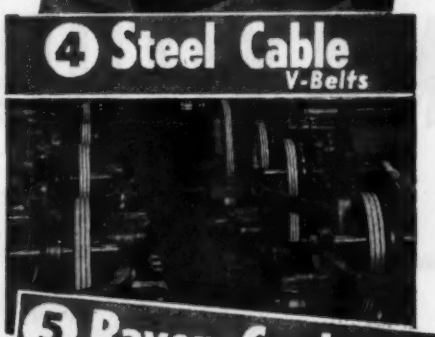
EXHALATION VALVE Basal valve assures complete expulsion of exhaled air, even when worker's head is down. Valve cannot stay open or fill with moisture. Dust cannot infiltrate.

INHALATION VALVE Positive, *extra* protection under all conditions. Holds rebreathing to minimum, keeps worker's efficiency high. Admits air at lightest intake of breath.

Which of these 5

GATES V-Belts

Best Fits *YOUR* Needs?



Your GATES RUBBER ENGINEER Can Tell You.

Phone Him TODAY!

Whenever a drive in your plant gives you the slightest trouble, it is a good plan to phone the Gates Rubber Engineer. He is a specialist who makes a business of improving drive operation.

For example, you may have a drive that appears to be wearing out belts faster than it should. In most cases the Gates Rubber Engineer can correct the difficulty quite easily and will find no need for you to adopt belts of any special construction.

At times, however, he will find conditions under which a V-Belt of special structure can most profitably be used—and he can then supply a Gates V-Belt that is precisely engineered to meet the unusual conditions.

The Gates V-Belt of special synthetic rubber is a case in point. For more than 6 years now, Gates has been supplying industry with many thousands of these belts. Under severe conditions of heat and oil, the Gates special synthetic belt actually outwears any natural rubber belt by as much 230%.

In your particular application, V-Belts with tension members composed of flexible steel cables—or of rayon cords—may prove to be the most efficient and economical. Again, Static-Safety V-Belts may best fit your special need.

In any case, the wisest move you can make is to phone the Gates Rubber Engineer. (Just look under "Gates Rubber" in your phone book.) He will come right to your plant—will thoroughly analyze any drive problem you may have—and he will always recommend the practice that will be most efficient and economical for you.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

4410

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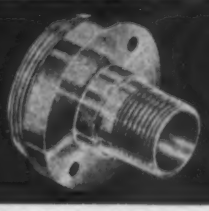
OUT OUR WAY
BY J. R. WILLIAMS
WHAT D'YUH MEAN NO STOCK!? YUH HAD MY REQUISITION TWO WEEKS AGO. YUH THINK THE WAR IS ALL OVER?
NO...WE DIDN'T THINK THAT... WE JUST DIDN'T THINK YOU HAD SUCH A PRIORITY ABOUT THAT.. WE DIDN'T THINK---
THAT'S RIGHT--- THEY JUST DIDN'T THINK
BUT THEY'LL HAVE TO THINK... AND FAST... TO ALIBI THAT SLIP
HEROES ARE MADE - NOT BORN
J.R. WILLIAMS

It's Fight to the Finish for the Old Bull

As long as there's one of our boys across either ocean, there's still a war on far as the Old Bull is concerned. He and the thousands like him the country over want these men supplied right up to the hilt with America's best. And America's best — America's precision equipment built on a mass-production, low-cost basis—is something the whole world has learned to respect. Even finer, more exacting than many of the highest prewar standards, it will stand us in good stead to make better products for America's millions when peace comes.

(*Below*) A few of the many thousands of our precision parts that help "Keep 'em flying and fighting." Let's all back the attack—Buy EXTRA War Bonds.

ERICSSON ESTABLISHED 1911



ERICSSON

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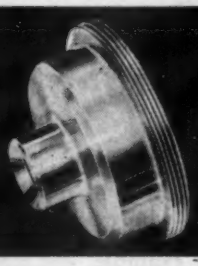
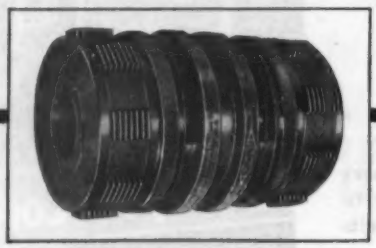


"MAXITORQ"



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The **"MAXITORQ" FLOATING DISC** principle speeds and simplifies all clutch operations. No tools required for installation, adjustment or take-down. Discs ride free in neutral . . . "you can see between them" . . . no abrasion, excessive heat or drag. Engagement easily controlled by light pressure. Long wear, quiet, smooth performance.

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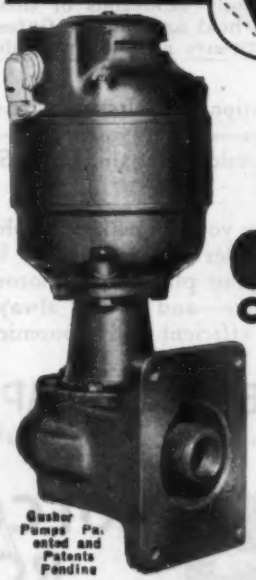

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The new models are so advantageous in operation that many plant engineers have re-designed or are re-designing their machine-tools to include them. By actual test these newer type Ruthman pumps have *proven* their superiority.

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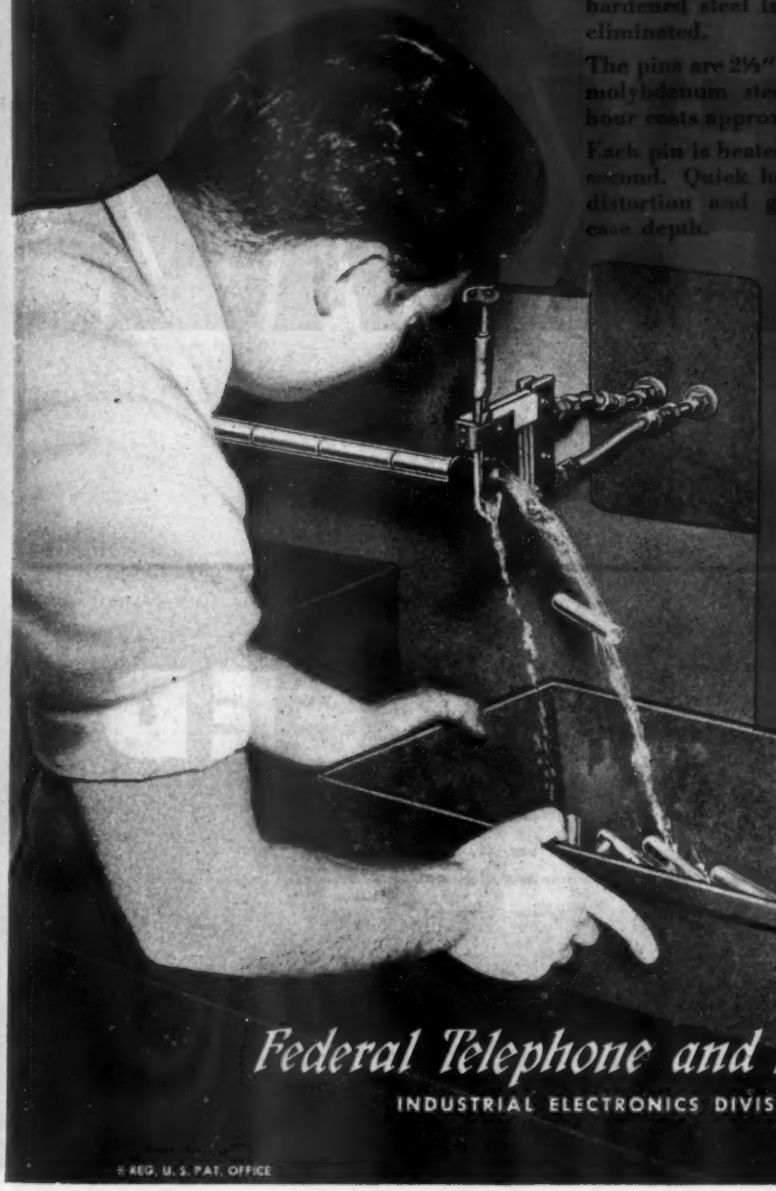
Here is a history-making application of a Megatherm Induction Heating Unit.

On this typical production line setup, 75 bearing pins a minute are surface hardened. This hardening is done after finish grinding has been completed.

In one high-speed operation the pins are hardened to Rockwell C 60—above file hardness—and costly finish grinding of hardened steel is avoided because scale and distortion are eliminated.

The pins are 2½" long and ½" in diameter, made of chromium molybdenum steel. To heat treat 4,500 bearing pins an hour costs approximately 50c.

Each pin is heated above critical temperature in less than one second. Quick heating and quenching prevents scaling or distortion and gives accurate control over the hardened case depth.



This is only one of the many new applications of Megatherm Heat in the metal industry. Pieces as small as ⅛" diameter or bearing surfaces up to 6" are handled as easily, all with Megatherm.

More information on how Federal's Megatherm High Frequency Heat can save you money on your production line is yours for the asking. Check Megatherm now.

This Microphoto *magnified 100 diameters shows the hardened surface developed on bearing pins. The white portion is that of the hardened outside layer which extends to a depth of 25 thousandths of an inch. At no point in the zone between the fully hardened case and the unhardened core was there any softening or tempering.*

100 X

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INDUSTRIAL ELECTRONICS DIVISION — An IT&T Associate — Newark 1, N. J.

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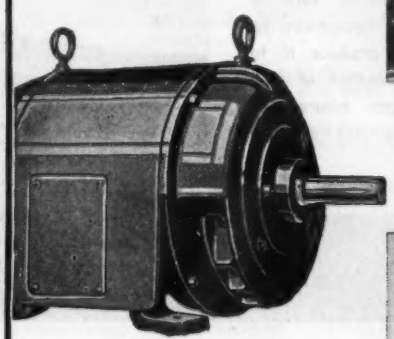
Applying these functions to boost production and improve quality is APPLICATION ENGINEERING. That's our business.



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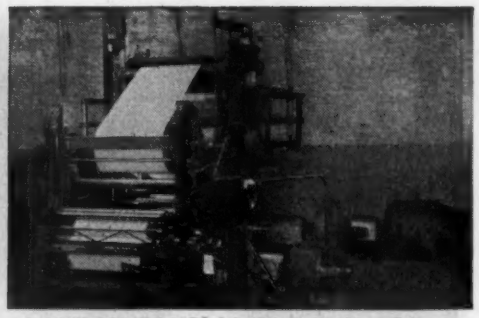
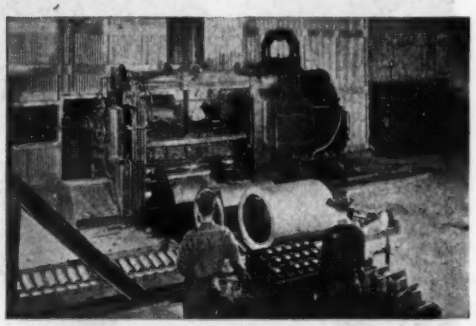
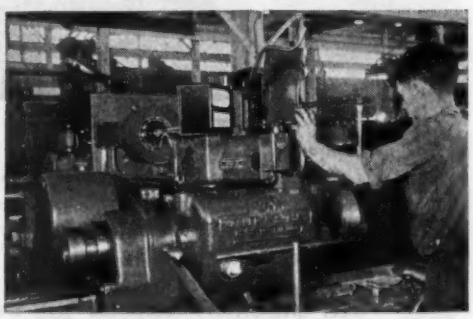


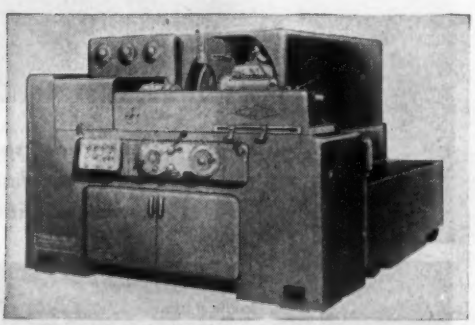
TENSION CONTROL (2569) Reliance Motor-drive for Tension Control is a good example of taking full advantage of characteristics inherent in the motor. It eliminates troublesome clutches . . . contributes substantially to the quality and uniformity of product which must be processed under tension.



TANDEM OPERATION (3124) The processing of materials in coil form is facilitated by the use of Reliance Tandem (or Range) Drive. Material moves faster with less handling . . . driving parts are simplified, space is saved. This is a subject of every-day consideration at Reliance.



SPEED CONTROL (4578) Nothing offers greater possibilities for the simplification of machine design than Reliance Adjustable-speed Drives. Available for both A-c. and D-c. Ease and convenience of control contribute to all-day, top-notch production.



STREAMLINING (3691) Used as a basis for streamlined design Reliance Motor-drive contributes to much more than beauty. Power is closer to where it is needed,—there are fewer mechanical "go-betweens". Control of starting, stopping, speed changing, reversing are centralized with other machine operations. The motor is made to do its complete job as a production aid.

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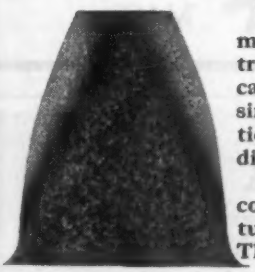
makes gear teeth wear better... last longer and transmit more power



Yes, two to three times the power will be transmitted by a surface hardened gear over an untreated gear of the same size. With small gears case hardening will satisfactorily produce the desired surface hardness. However, this is not practical for large gears because of the relatively high distortions, so Flame Hardening was developed.

In flame hardening of Philadelphia Gears the core of each tooth remains unchanged in structure since the heat penetration is controlled. The cross-section cut at the right shows the pattern of hardness obtained. Note that all of the wearing surfaces are hardened.

No measurable distortion can be found in surface hardened gears. Tooth bearings have been repeatedly checked before and after surface hardening and show no change.

Our Catalog No. 42 gives further details on flame hardening, and also describes our complete facilities for manufacture of industrial gears of all types. Write for a copy on your business letterhead.

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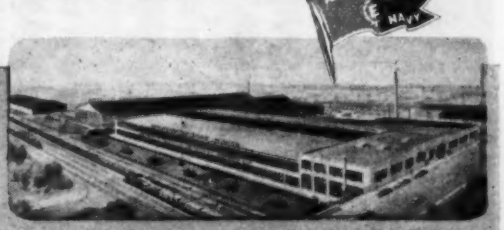
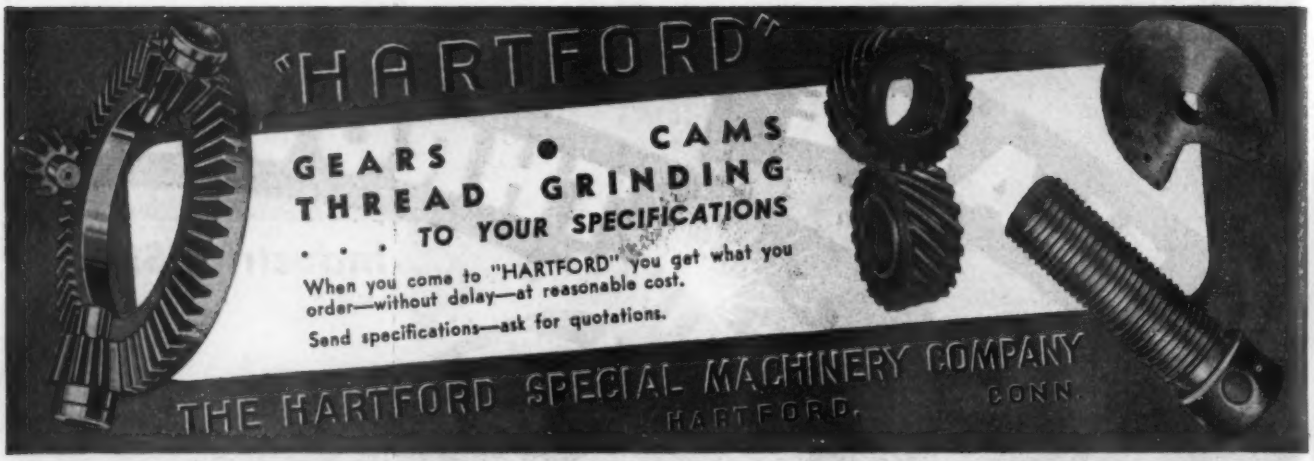


Industrial Gears and Speed Reducers
LimiTorque Valve Controls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The Cincinnati Gear Company are specialists in the manufacture of gears to meet specific needs. Our modern plant is equipped with the finest and most accurate equipment for the control and production of GOOD gears.

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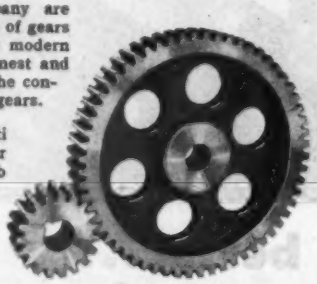

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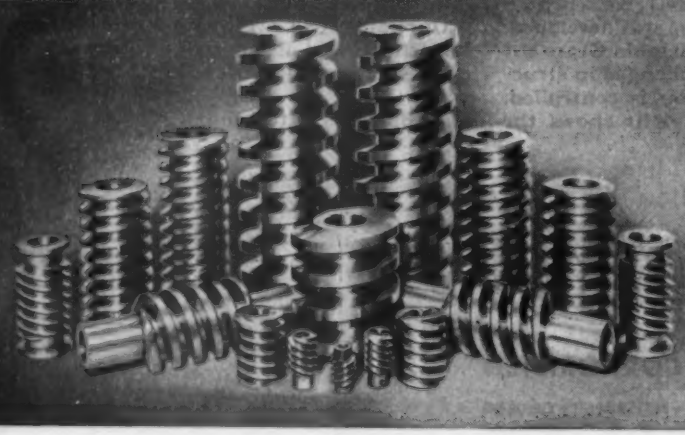

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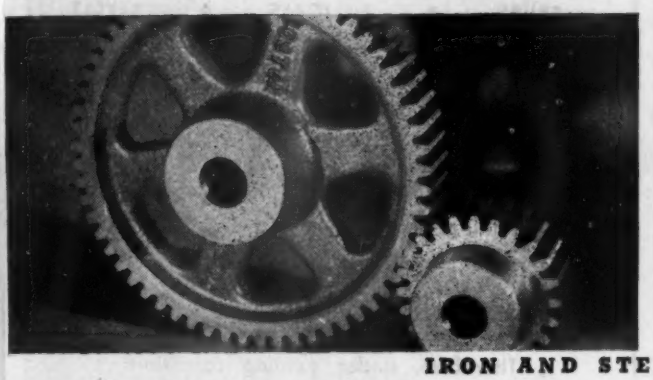
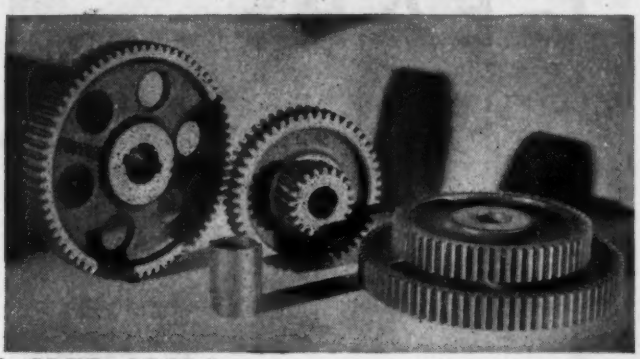
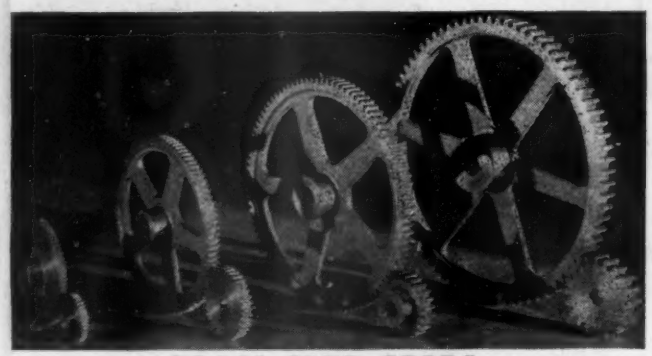
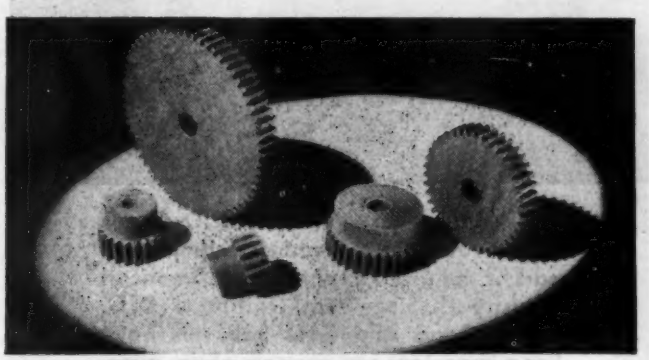




IRON AND STEEL SPUR GEARS



BRASS SPUR GEARS



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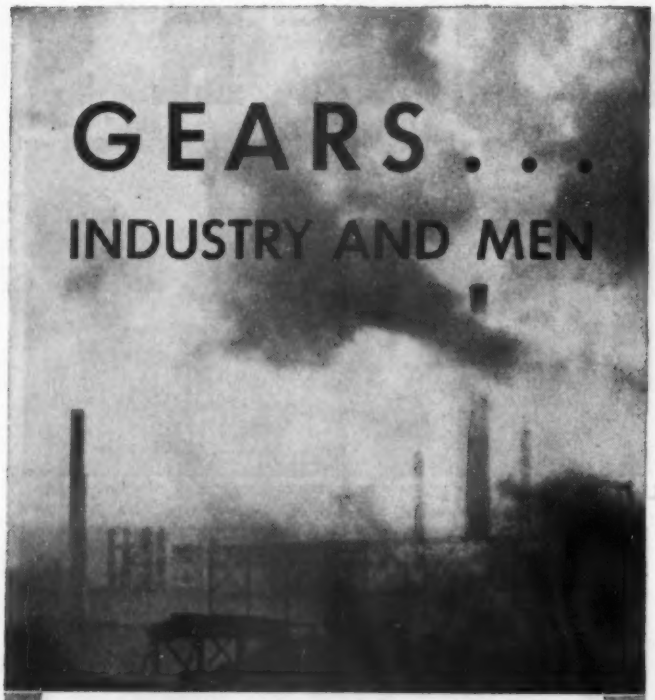

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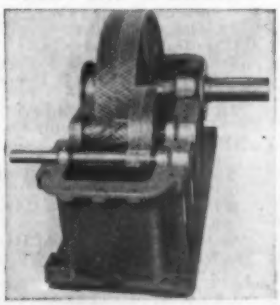

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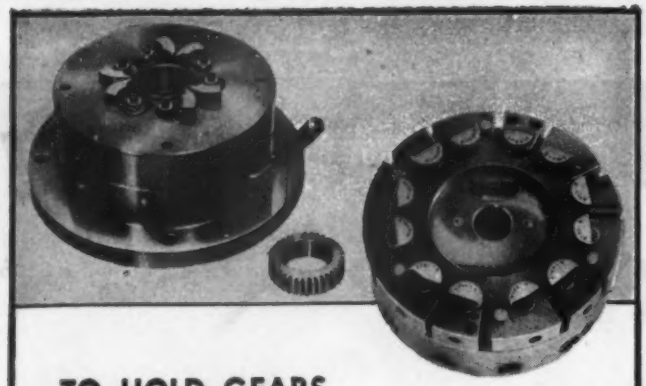

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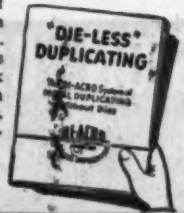

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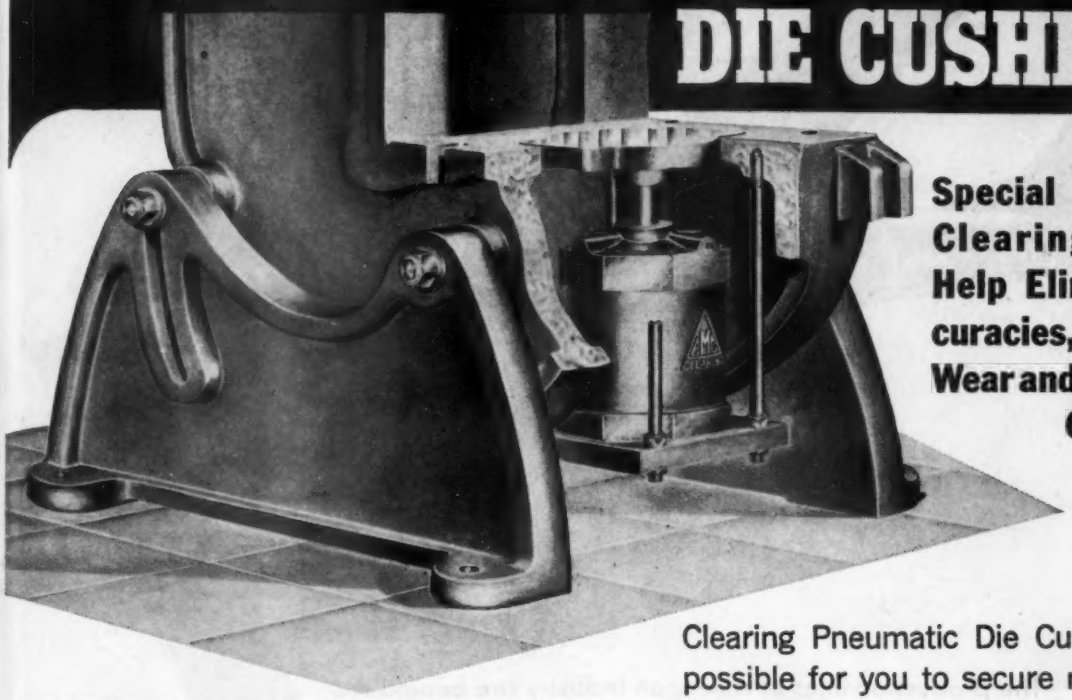

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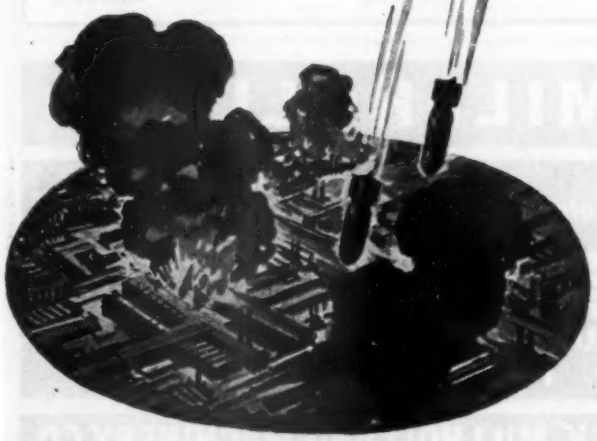

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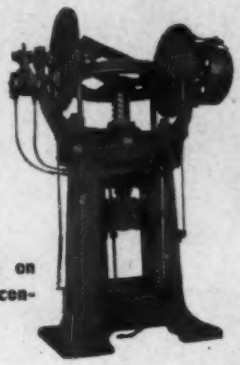

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For hot pressing brass and non-ferrous metals, cold pressing steel parts, and press forging heaviest steel parts. Excellent for coining, sizing, or striking.

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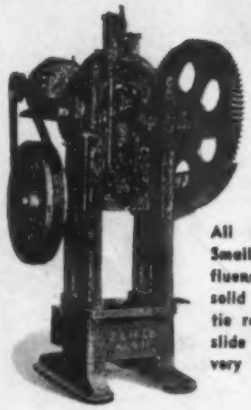

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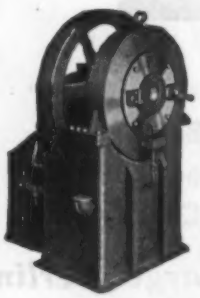

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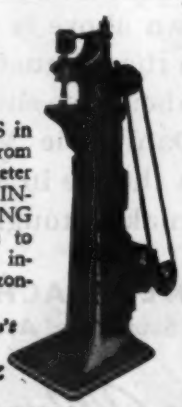

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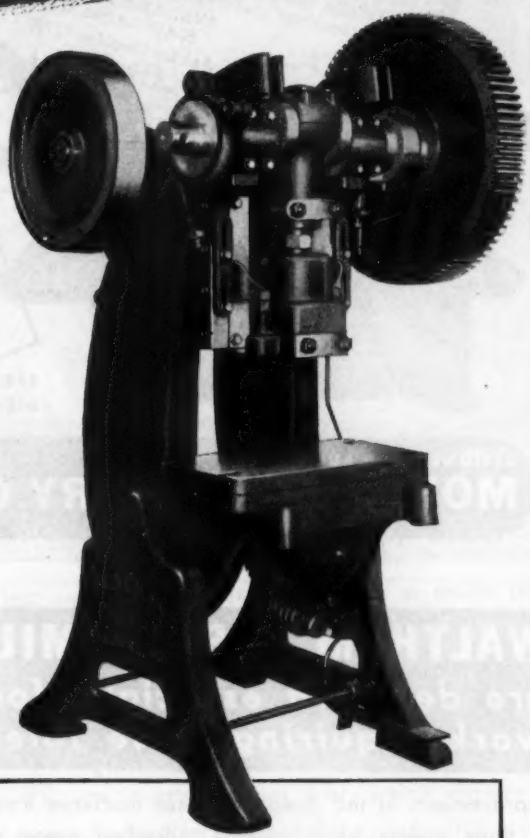

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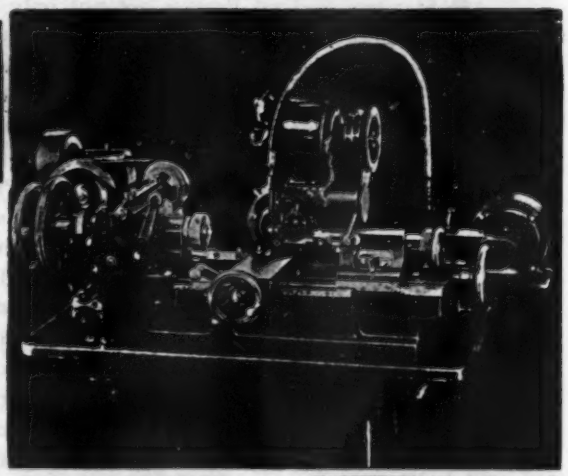

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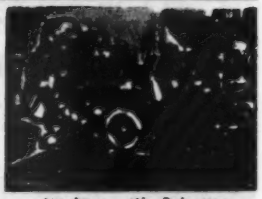

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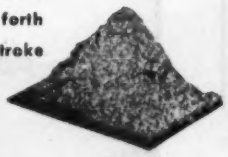

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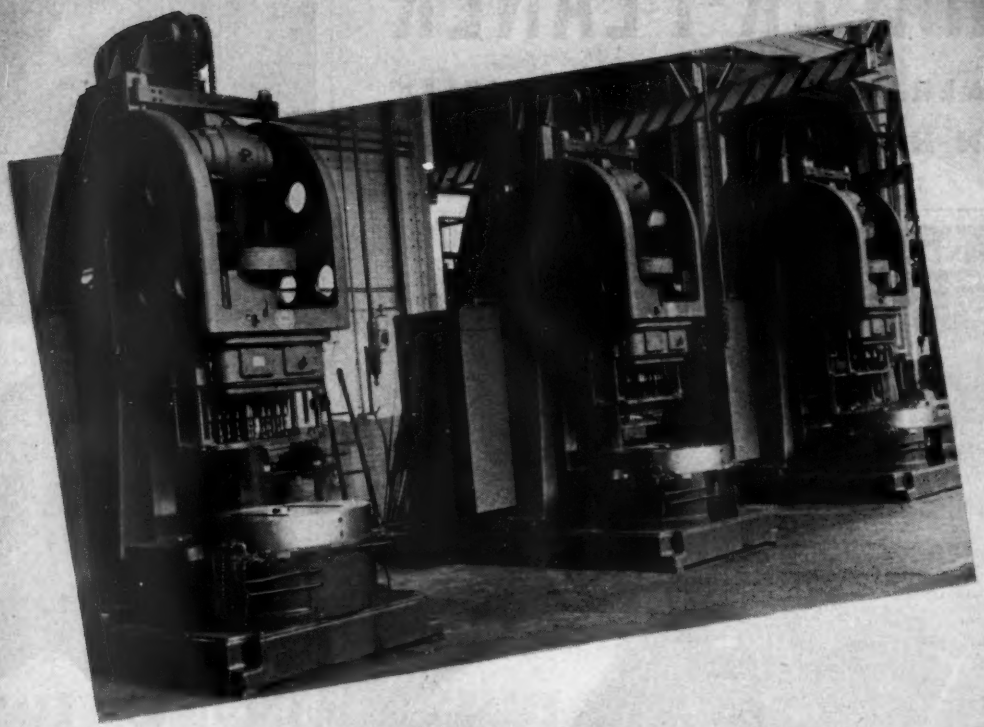

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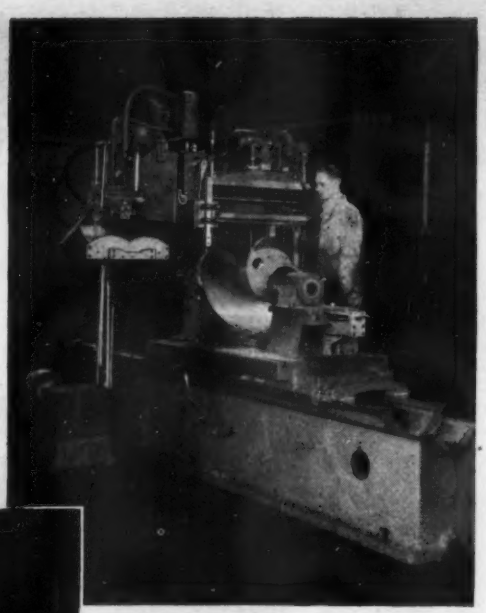
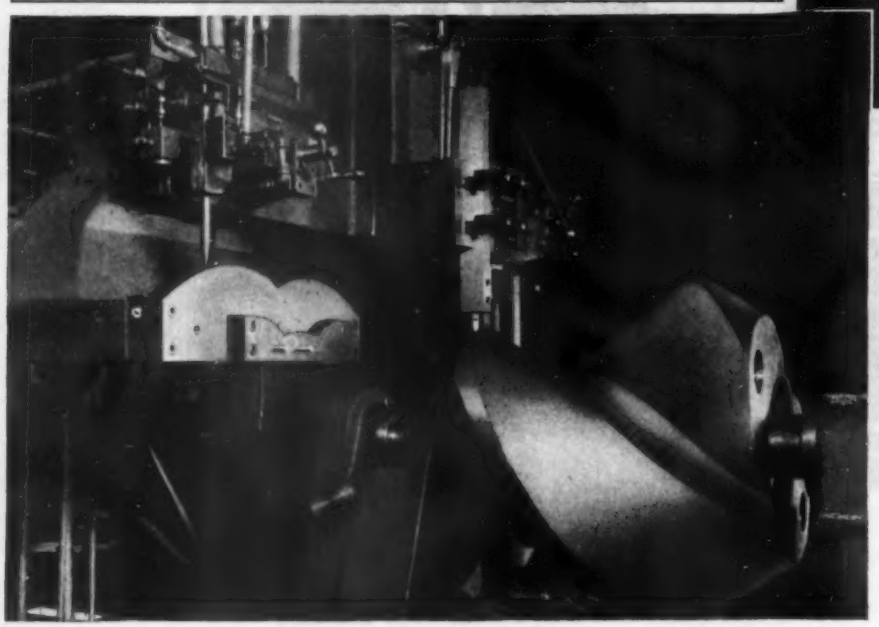
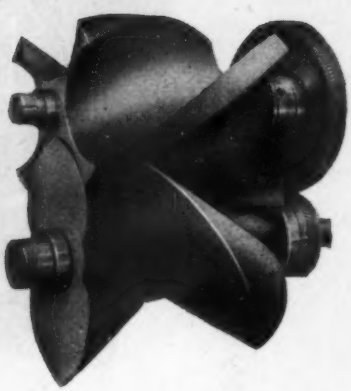




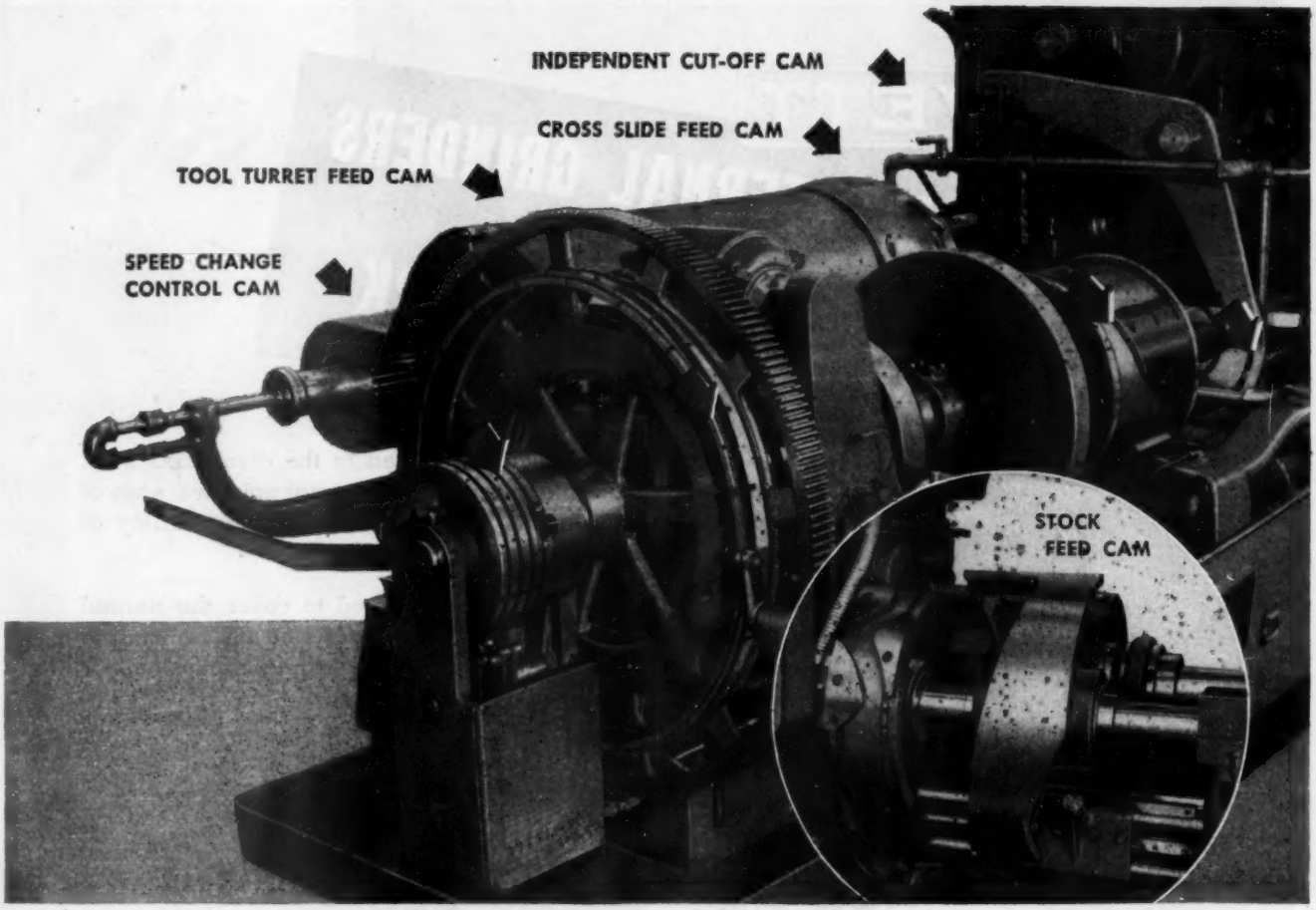


Diesel engine blower rotors machined on Hy-Draulic Shaper-Planers

Illustrated is a 32″ x 36″ x 90″ Hy-Draulic Shaper-Planer, with Hy-Draulic Duplicator, which generates 180° of helix in two-lobed rotors for diesel engine blowers. Material is cast bronze which is machined all over the contour in two cuts, roughing and finishing. Practical cutting conditions on the high-angle helix are created by dividing the cuts into three sections each governed by the master form on the Hy-Draulic Duplicator. The helix is generated by accurately controlled automatic rotation of the work-piece as it is presented to the cutting tool. Also automatic is the hydraulic action which moves the cutting tool out of contact with the work-piece on its rapid return stroke thereby conserving the cutting edge, protecting the machined surface and promoting high production. The mating parts for these rotors are likewise machined on a Hy-Draulic Shaper-Planer, and that's another interesting story. For details of both, write today for Bulletin 1116.

4408

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS



FOR THE TOUGHEST JOB (it's yet to come) YOU WILL NEED CLEVELAND AUTOMATICS

THE toughest production job for all of us comes AFTER culmination of the first big phase of the war. Directly ahead lies another big war job, plus the problem of satisfying the tremendous demands of a goods-hungry world . . . maintaining quality in the face of raw material difficulties . . . operating on higher labor costs . . . AND producing at a price that will meet the fiercest competition in history. Increased efficiency of production is the obvious answer. That is why Cleveland Automatics play such an important role in the new economics of production.

Every operation on a Cleveland Single Spindle Automatic is controlled by standard cams, easily reached and quickly set to any position with the aid of a universal adjustment feature. The ratio of cost time to earning time is bettered by the speed and ease with which tools can be readied for productive operation. With men responsible for production, Cleveland Single Spindle Automatics have a reputation for two important advantages. 1. Maximum sustained low-cost production on long runs, with minimum down time for adjustments. 2. Profitable economy on small lot, short run jobs. Let us show you how it works out on one of your jobs.

CHICAGO (6):
1408 Civic Opera Building
DETROIT (2):
540 New Center Building
NEWARK (4):
902 American Insurance Bldg.
CINCINNATI (12):
4932 Beech Street
HARTFORD (1):
529 Capitol National Bank Bldg.

Just Remember, Cleveland's Cut Costs

THE CLEVELAND AUTOMATIC MACHINE CO.
CLEVELAND 3, OHIO

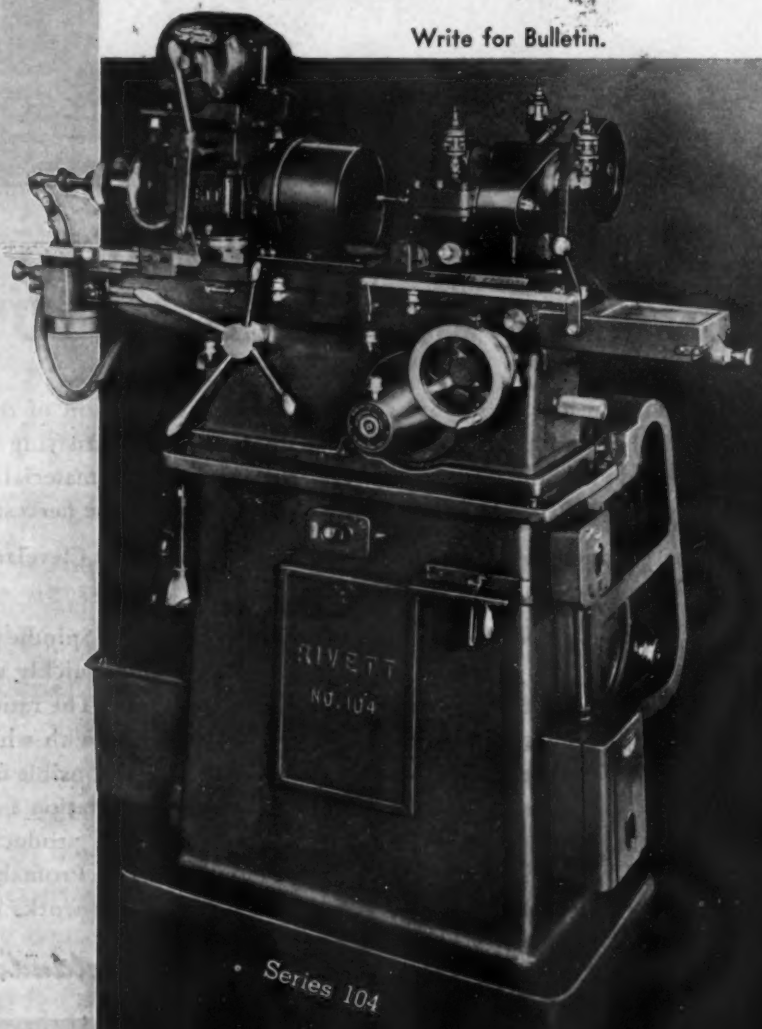
RIVETT

INTERNAL-EXTERNAL GRINDERS FOR DIE AND TOOL-ROOM WORK

Rivett grinders are particularly suited to the diversified work of the tool-room. Available internal and external spindles, ease of set-up and many adjustments, make practical a wide variety of grinding operations.

Two sizes of Rivett grinders are offered to cover the normal range of tool-room work. Series 104 has grinding capacity up to 3" diameter by 4" length. Series 112 has grinding capacity up to 8" diameter by 8" length.

Write for Bulletin.



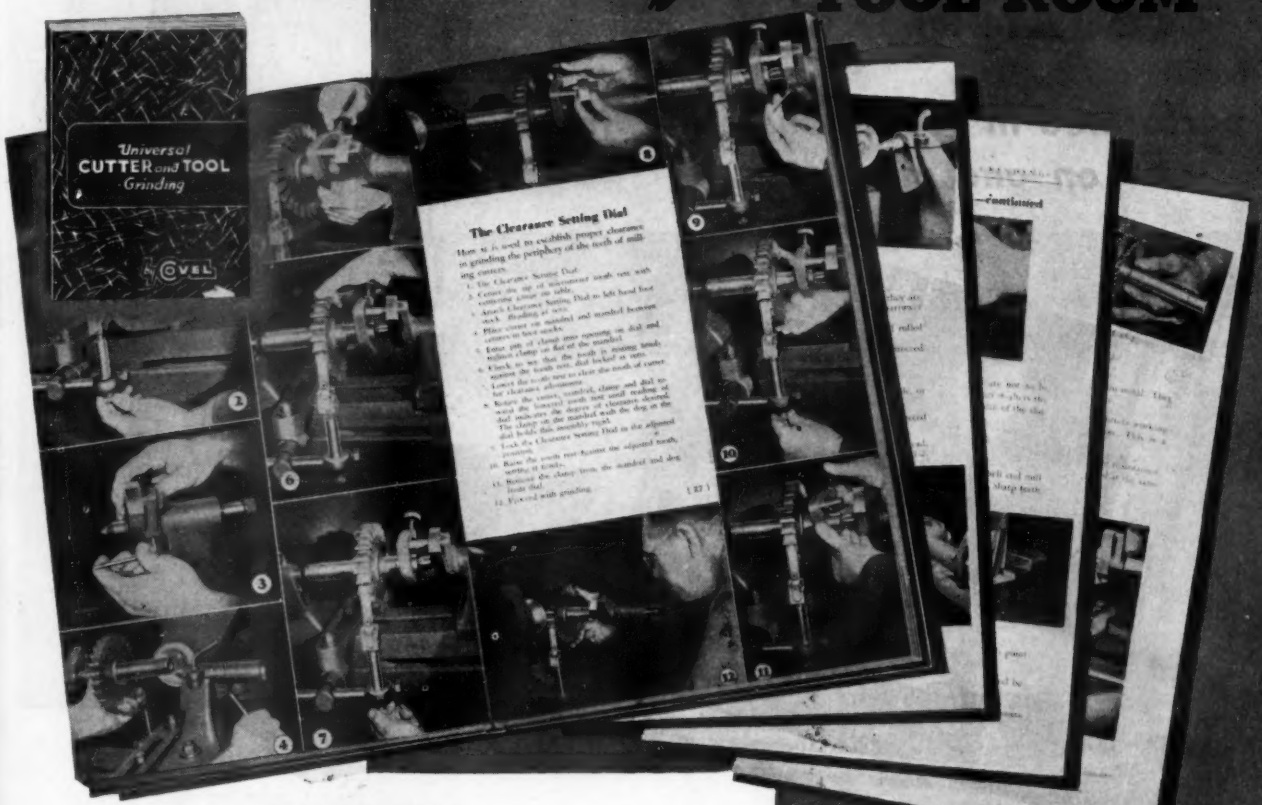
Series 104

ARMY E NAVY

RIVETT LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS., U.S.A.

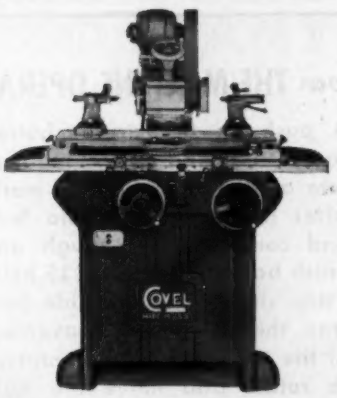
Here's Help FOR YOUR TOOL ROOM



The New COVEL
CUTTER & TOOL GRINDING MANUAL

A time-and-money saving factual aid for new hands in the toolroom—and for seasoned veterans, too! A 128-page book that takes you through every step in setting up all types of milling cutters for grinding; that explains in graphic detail the use of various accessories on cutter and tool grinders;—covers thoroughly the operation and use of a cutter and tool grinder;—gives practical help in choosing the right grinding wheel for every job . . . Plus page after page of grinding tips and short cuts that will mean added savings in time and manpower for you. And there's a whole section of tables and charts, arranged for handy reference, to cut down pencil and guess work. Write your name and position on your company letterhead, and send it to us for a free copy of this new Covel Manual, "Universal Cutter and Tool Grinding"—A regular $1.00 value—but it's *free* to you toolroom and production men. Write for "Handbook A-224C" today!

This is just another example of Covel Service to industry. Since 1874, manufacturers have been bringing their grinding problems to Covel, with complete satisfaction. This company now offers a complete line of Cutter and Tool Grinders, Drill Grinders and small Surface Grinders. Let Covel experience show you what can be done to improve production and cut costs in your toolroom.



Covel No. 12 Cutter and Tool Grinder

GRINDING MACHINERY SINCE 1874

COVEL INDUSTRIAL GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICHIGAN U. S. A.

Still Another Application of the No. 10 LeMaire Drilling Machine

ROUGH and FINISH BORING
—FACING (Fly-Cutting)—
COUNTERSINKING

All performed in continuous operation on one machine

Mounted on a standard No. 10 LeMaire Vertical Drilling Machine is a No. 5000 Twin Ram equipped with a LeMaire boring, facing (fly-cutting) and chamfering head. Here you have a complete machine that performs several operations at one setting with greater speed and accuracy than has ever been possible before.

As you know, conventional face milling cutters used on large diameters very frequently produce disappointing results because the vibrations that are set up cause chatter marks and inaccuracies in work.

This machine produces ten housings an hour at 100% efficiency with carbide tipped tools.

This is only one of the many ways in which these hydraulic units are combined with our standard drilling units to bring new efficiencies in production.

Think of the process as well as the product when you plan your postwar production. Let us explain the versatility of these machines.

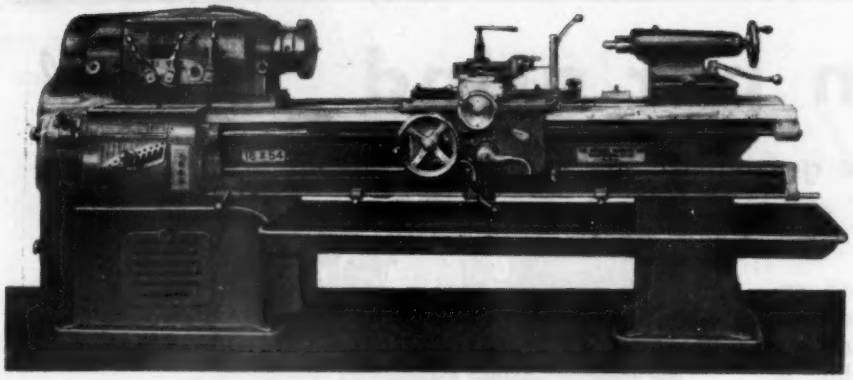
How THE MACHINE OPERATES

A push on the starter button causes the head assembly to rotate as it approaches the work. After the unit drops into feed and completes the rough and finish boring of the 11.125 hole, "stop rings" on the guide bars stop the downward movement of the assembly but it continues to rotate and move the quill with the facing tools to "fly cut" across the work. A bell-crank then actuates the countersinking tool which feeds to depth and dwells before returning to unloading position.

LeMaire

BUILDERS OF
SINGLE AND MULTIPLE SPINDLE MACHINES
FOR BORING, DRILLING, REAMING,
TAPPING, ETC.—TWIN RAM HYDRAULIC
UNITS—MATCH-IT GEAR CHUCKS

LEMAIRE TOOL & MFG. CO. • 2665 S. TELEGRAPH ROAD • DEARBORN, MICHIGAN



HENDEY

PRECISION PRODUCTION GEARED HEAD LATHES 10" to 24" SWING

One of the major problems in the minds of forward looking manufacturers to-day is the preparation for the return to production of civilian goods, and the purchasing of equipment necessary for the efficient manufacturing of such merchandise.

Machine Tools, "The Master Tools of Industry", will be called upon to play an important role in the equipping of plants and in plant maintenance. The fact that The Hendey Machine Company has been manufacturing machinery for 70 years (1874-1944), is a valid assurance that Hendey Lathes and Shapers can be bought with confidence that they will give more than satisfactory performance.

There is no time like the present in which to become informed on the mechanical details of Hendey Lathes and Shapers; bulletins covering which are to be had for the asking.

THE HENDEY MACHINE COMPANY

TORRINGTON, CONNECTICUT, U. S. A.

BRANCHES

BOSTON NEW YORK ROCHESTER DETROIT CHICAGO

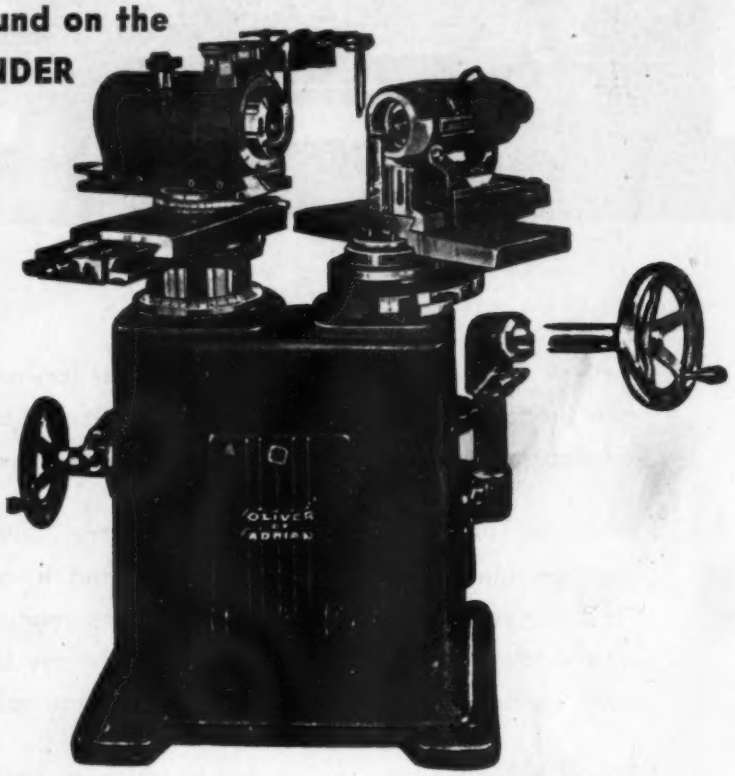
HENDEY

HIGH SPEED AND HEAVY DUTY CRANK SHAPERS

12-inch to 28-inch Stroke

Production per grind *Doubled*

when Milling Cutters are ground on the
OLIVER ARC FACE MILL GRINDER



Assure the fastest, most accurate and productive performance from every Face Mill in your plant by grinding them on the OLIVER ARC FACE MILL GRINDER. In most cases, reports after installation indicate that production per grind has been DOUBLED over previous methods. That means less grinding time—greater cutter life—fewer shutdowns—improved work—faster feeds and speeds. Important items in any plant!

The OLIVER ARC FACE MILL GRINDER produces, in one continuous movement of the grinding wheel, the correct face and periphery on all types of Face Mills and creates a round corner between these two surfaces, blending the corner exactly into the cutting edges—and giving the form that results in maximum production and greatly reduced cutter breakage. Check the facts below, then send for further details on the production-speeding . . .

OLIVER NO. 2 ARC FACE MILL GRINDER

The Oliver ARC Face Mill Grinder grinds the true round corner absolutely indispensable to modern heavy-duty milling practices. Saves time, too—since wheel traverses entire cutting surface at one stroke, it is necessary to index the cutter only one-third the number of times. Requires only a few simple adjustments to set up any cutter from 6" to 26" in dia., for any angle from 0 deg. to 90 deg., for any angle of "dish", plus or minus. Extra sturdy. Precision built throughout. Also sharpens End Mills, Side Mills, Channeling Cutters, Convex Profile Cutters, etc. No. 2A Machine, not illustrated, available for smaller work, 1" to 6" dia. Write for details!

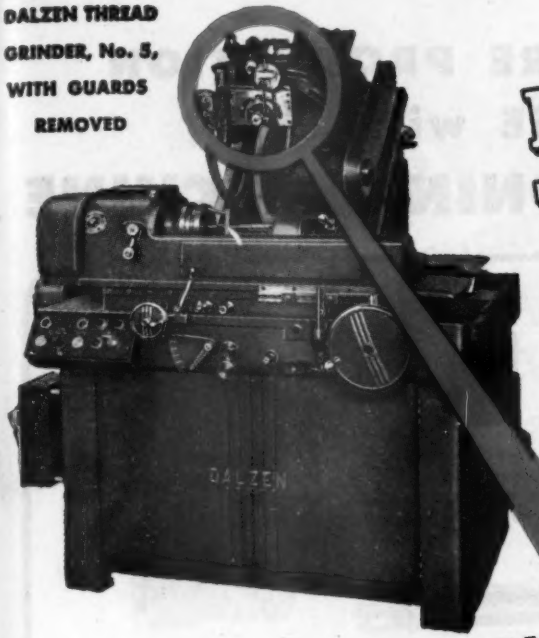
Don't Neglect Your Toolroom It's the Backbone of Production!

OLIVER INSTRUMENT COMPANY
1414 E. Maumee Street, Adrian, Michigan

Oliver
OF ADRIAN

AUTOMATIC DRILL GRINDERS — TOOL AND CUTTER GRINDERS — DRILL POINT THINNERS — TEMPLATE TOOL GRINDERS — FACE MILL GRINDERS — DIEMAKING MACHINES

DALZEN THREAD GRINDER, No. 5, WITH GUARDS REMOVED



IN THREAD GRINDING . . . THE *DRESSER'S* THE THING!

AUTOMATIC DRESSING IS PROVIDED IN THIS *New* DALZEN *Electronic* THREAD GRINDER

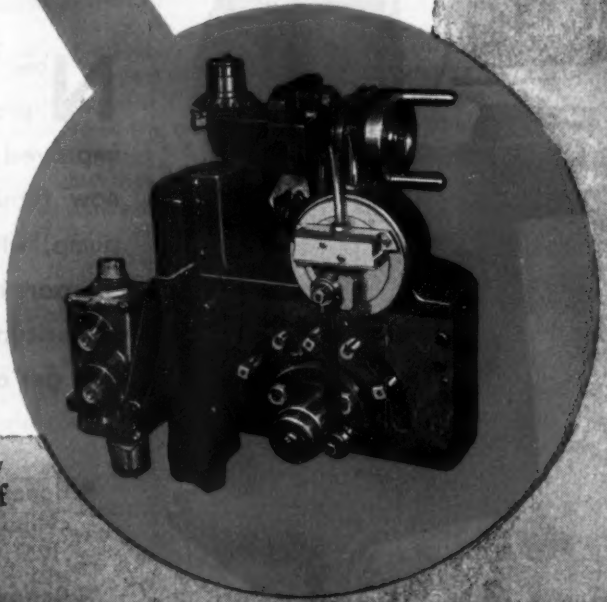
● Accuracy of a ground thread depends upon the accuracy of the dressed wheel. Precision, finish and production efficiency in thread grinding are determined primarily by the dresser.

DALZEN engineers always have recognized this fact. Now . . . the new DALZEN Electronic Thread Grinder presents the latest and best in dresser efficiency—offering new and special advantages in dressing performance.

The new DALZEN Thread Grinder with General Electric Thy-mo-trol drive provides maximum production of threaded parts, thread gages, straight and spiral fluted taps, and thread milling cutters. Grinding speed—both wheel and work—forward and reverse—is adjusted by the twist of a dial. Variation is infinite and stepless. It's an investment in *better* thread grinding, and a *low-cost* investment at that!

An attractive three-color folder describing the new DALZEN Models 5 and 6 will be sent you, free of charge, on request.

In addition to thread grinding machines, DALZEN also manufactures precision ground broaches, thread milling cutters, taps, threaded parts, and the Dalzen "2-in-1" combination center grinder and drill press. Write for descriptive literature.



DALZEN

TOOL & MANUFACTURING COMPANY

12255 EAST EIGHT MILE ROAD • DETROIT (5), MICH.

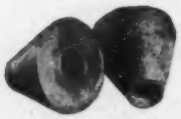
GREATER ACCURACY—MORE PRODUCTION ON PARTS LIKE THESE with the SUNNEN PRECISION HONING MACHINE

Stainless Steel Load Compensator Valve Seat. Hole is honed to .0002" limit.

Roller Bearing Outer Race. Finish improved from 12 micro inches to 2 micro inches.

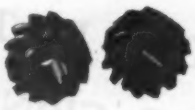
Inner Bearing Ring "Accurately removes last 'tenth' of stock."

Saved time in producing a smooth accurate finish on this bronze remote control valve body.



Cones for Wheel Balancing Machine "Accurately align hones two interrupted surfaces."

Hydraulic Two-Way Control Valve. Hole is honed to eliminate leakage.



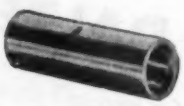
Automobile Distributor Shaft Gears. Taper removed at a rate of 80-90 per hour.

Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00005 inch."

Aircraft Valve Guide. Valve tappet roller pin hole honed to 6 micro inch finish.

Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.

Aircraft Hydraulic Brake Cylinder. Honing 3 times faster than lapping — and gave a straighter hole.



Aircraft Piston Pin. Sunnen honing is twice as fast and gives a cleaner, better looking pin.

Now you can get even greater accuracy and more production per hour than ever before with the improved Sunnen Precision Honing Machine. This machine is now furnished with a larger base containing a coolant pump, which provides a constant flow of honing fluid to the part being honed. The fluid acts both as a coolant and a lubricant, giving better honing properties to the abrasive. You get a smoother finish, more accurate work in less time.

Consider These Advantages, Too

- **Hones and finishes internal cylindrical surfaces from .185" to 2.625"**
- **Can be used in any metal or plastic except lead or babbitt**
- **Does not require skilled labor**
- **Accuracy guaranteed within .0001"**
- **No jigs or fixtures needed**
- **Economical to operate**
- **Quickly and easily set up**

The coveted Army-Navy "E" waves over the Sunnen plant—evidence of the important part Sunnen equipment is playing in the war effort.

Why not write today — asking a Sunnen engineer to show you how it can be used on your jobs — or ask for a bulletin giving complete information?

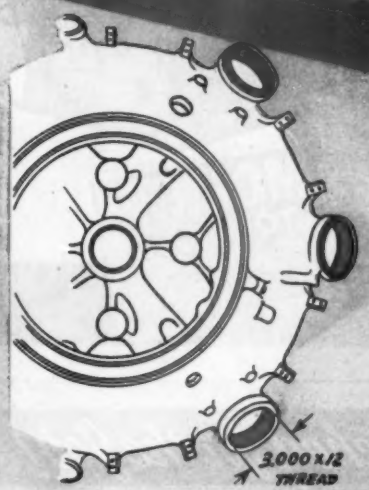
SUNNEN

SUNNEN PRODUCTS COMPANY, 7941 Manchester Ave., St. Louis 17, Missouri

Canadian Factory: Chatham, Ontario

REDUCE "HOLE" COSTS

NATCO ANGULAR SEQUENCE MACHINES COMBINATION BORING, FACING, CHAMFERING, AND TAPPING



The above is a partial diagram of the magnesium alloy blower casing processed on the NATCO machine illustrated. The part has seven angular outlet ports. Located on the center of the automatic rotating table the part is consecutively indexed in each of the seven positions while the three units operate upon three ports in proper sequence.

The left-hand angular unit combination rough bores and faces.

The rear angular unit combination finish bores two diameters, finish chamfers and faces.

The right-hand angular unit taps.

All operations are automatic from a push-button start. Production is 3½ parts per hour.

During the war period, with the emphasis on *speed*, NATCO machines played a vital role in rapidly supplying the United Nations with fighting equipment. During the intense competition of the years ahead, with the emphasis on speed and *economy*, NATCO machines will be essential for holding down production costs.

Take the illustrated NATCO as an example. It is a combination of three NATCO standard HOLEUNITS. One man operates it. Conveyance of parts between units is eliminated, thus saving floor space and equipment.

This is only one of many NATCO way-type machines built for specific jobs. Our literature illustrates and explains a score of them. Ask for the literature and you will probably see descriptions of NATCO machines doing work similar to yours.

PRECISION, SPEED, ECONOMY

NATCO way-type machines are built up of NATCO standardized HOLEUNITS to combine operations on the work. The basic purpose of a NATCO machine is to process multiple holes automatically to reduce hole costs. This results in increased production. It also assures precision because the opportunity for human error is held to a minimum.

You are invited to send us your blueprints or have our field engineers make a survey of your requirements.

NATIONAL AUTOMATIC TOOL COMPANY, INC., RICHMOND, IND.

MULTIPLE DRILLING, BORING, AND TAPPING MACHINES

INVESTIGATE NATCO METHODS FOR THE LOWEST POSSIBLE HOLE COSTS!

SALES OFFICES: 1809 ENGINEERING BLDG., CHICAGO; 409 NEW CENTER BLDG., DETROIT; 1807 ELMWOOD AVE., BUFFALO; 2902 COMMERCE BLDG., NEW YORK CITY.

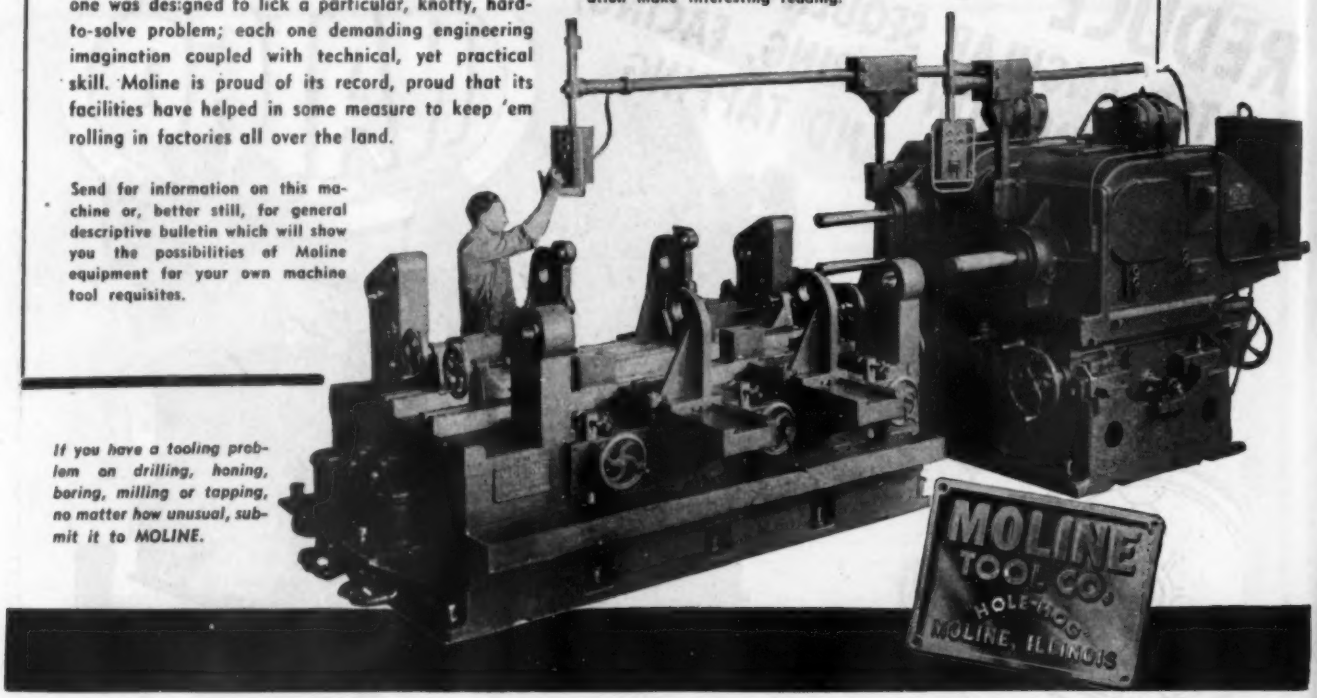
MOLINE *Licked A Special Boring Problem*

Since the beginning of the war, with the added need for specialized machine tools in new industrial uses, Moline has developed more machine tools for specific, unusual uses than ever before. Each one was designed to lick a particular, knotty, hard-to-solve problem; each one demanding engineering imagination coupled with technical, yet practical skill. Moline is proud of its record, proud that its facilities have helped in some measure to keep 'em rolling in factories all over the land.

Send for information on this machine or, better still, for general descriptive bulletin which will show you the possibilities of Moline equipment for your own machine tool requisites.

If you have a tooling problem on drilling, honing, boring, milling or tapping, no matter how unusual, submit it to MOLINE.

The machine pictured here, the Moline MR121, is a Special Horizontal Boring Machine, designed for boring the crank and cam lines in three different diesel engine frames, the largest of which measures about 9 ft. by 4 ft. by 2 ft. over-all. Many unusual features were incorporated in the construction of the MR121, its features and operation make interesting reading.



SIGOURNEY M-100

COMPLETELY ENCLOSED FOR OPERATOR SAFETY

In the Sigourney M-100 Drilling Machine all moving parts except the chuck and drill are completely enclosed for maximum safety in operation.

Ideal for fine precision drilling and maintained accuracy, the Sigourney M-100 has sealed ball bearings throughout . . . hardened and ground spindles . . . Standard Machine operates at speeds from 4,000 to 10,000 R. P. M., other speed ranges available . . . manufactured in 1, 2, 3 and 4 spindle models.

Send for Illustrated Bulletin

THE SIGOURNEY TOOL CO.

Hartford 6, Conn.

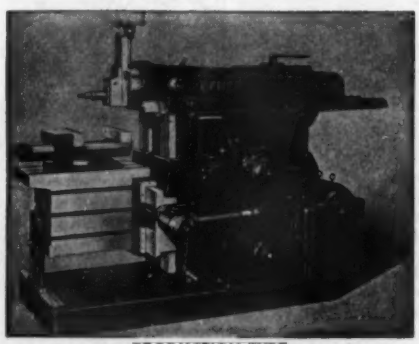
Sole Sales Agents

PRATT & WHITNEY

Division Niles Bement Pond Co . . . West Hartford, Connecticut

Matched for the Job!

GEMCO *Multi-Purpose* SHAPERS



PRODUCTION TYPE

PLAIN TYPE A fast utility machine for a wide variety of the average shop work and for training purposes in industrial schools.

PRODUCTION TYPE Massively constructed with a large table to handle medium heavy work on a peak production basis with high limits of accuracy.

UNIVERSAL TYPE Ideal for tool and die work, experimental laboratories and model shops or where angular work set-ups are required.

Write for Illustrated bulletin GC. 12 EM.

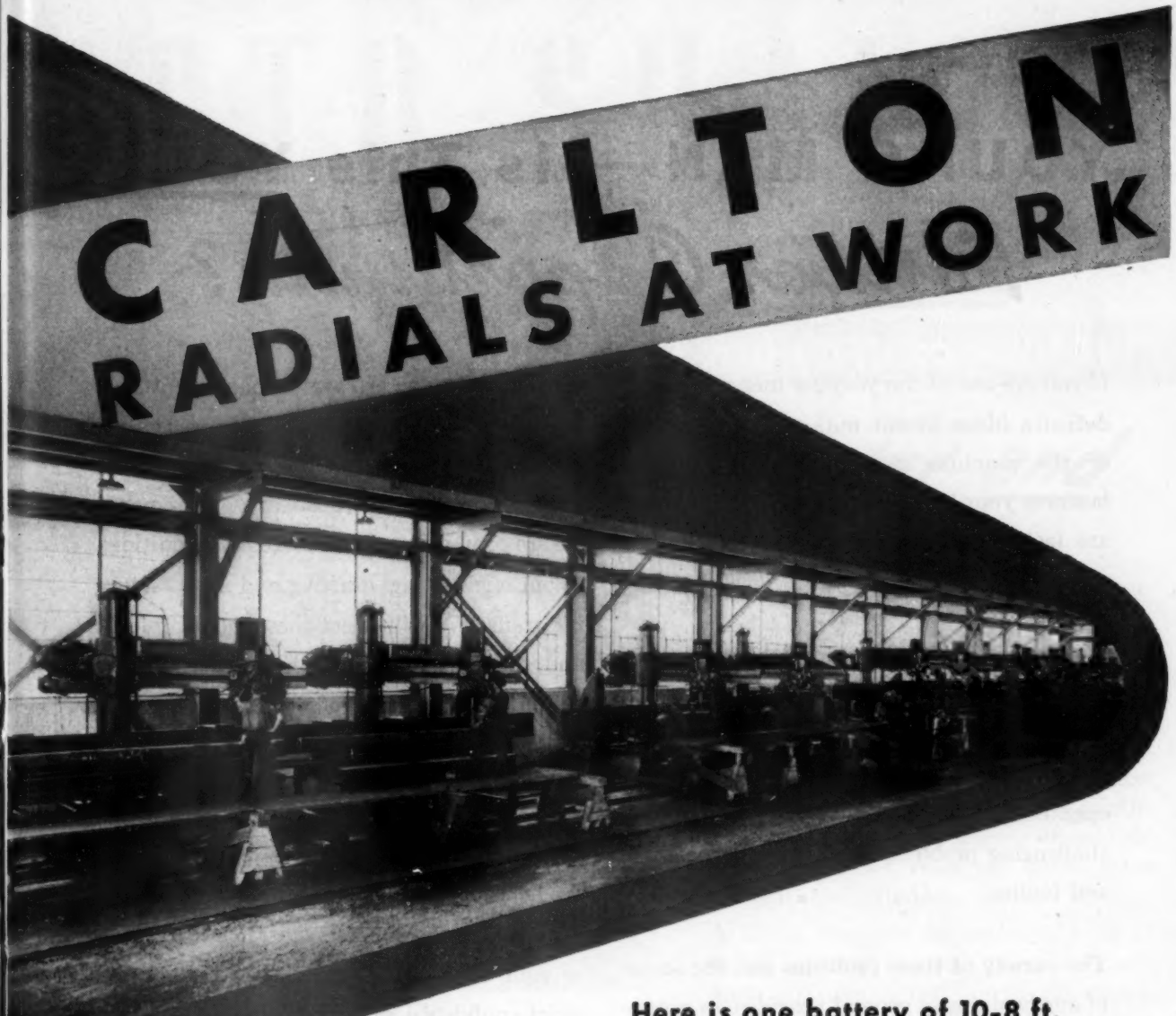
Available in sizes ranging from 16" to 24" inclusive.

GENERAL ENGINEERING & MFG. CO.

ST. LOUIS 4, MISSOURI

Manufacturers of Precision Equipment SINCE 1917

CARLTON RADIALS AT WORK



Here is one battery of 10-8 ft. Carlton Radials in one of the largest manufacturers of boilers in the United States. Many other Carlton Radial Drills are also being used by this company.

ARMY E NAVY

THE CARLTON MACHINE TOOL COMPANY

Manufacturers of RADIAL DRILLS *Exclusively*

CINCINNATI 25, OHIO, U. S. A.

YOUNG MAN—Is This YOUR *Postwar Opportunity?*

If you are one of the younger men who have definite ideas about making some phase of the machine designing and building business your life work, the opportunity you are looking for may be within the Snyder organization.

We design and build machines for a wide variety of operations. These are mostly special-purpose machines and frequently involve complex operations or multiple operations which present interesting and challenging problems in design, construction and tooling.

The variety of these problems and the scope of our business in general provides an exceptional opportunity to increase your knowledge and experience while working with the men under whose guidance this company has achieved its position among the leaders in this field.

Undoubtedly you are aware that the special-purpose machine will play an even greater role in postwar than in prewar days and in preparation for these postwar developments we are contemplating the necessary additions to our engineering, drafting and manufacturing staffs. We will select these men carefully and they will receive a thorough course of training under some of the country's best engineers and shop men.

If this opportunity appeals to you, we invite you to write to our Personnel Manager, outlining your experience and ability and indicating your ideas and aspirations in regard to your life work. Your letter will be held in strict confidence, of course.

Clarence Snyder

PRESIDENT

SNYDER TOOL AND ENGINEERING COMPANY

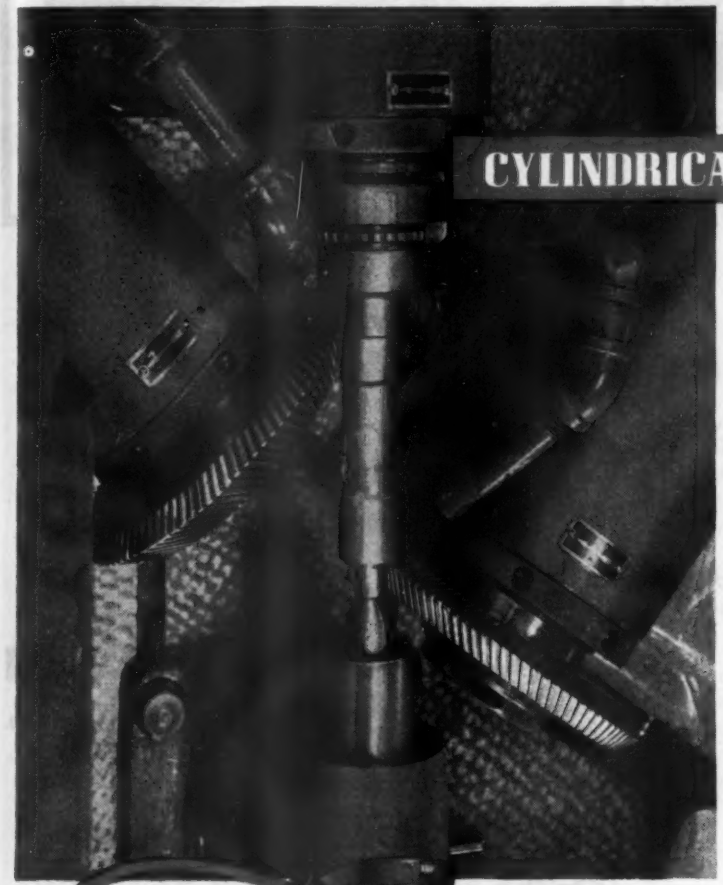
3400 East Lafayette • Detroit 7, Michigan

SNYDER

DESIGNERS AND BUILDERS OF
SPECIAL-PURPOSE MACHINES
FOR HIGH PRODUCTION
AT LOW UNIT COST

20 Years of Successful Co-operation with Leading American Industries

ROTO SHAVING



Finishes

CYLINDRICAL and CONICAL SURFACES

Faster and Better

On parts having a hardness of 38 Rockwell or less, Roto Shaving is better than grinding because it is faster, more economical and the finished surfaces can be maintained to a high degree of smoothness. Production rates are about three times that of grinding.

A 100% complete inspection of a lot of 4,000 consecutive pieces reveals a maximum variation of .001″ on the diameters. Stock removed ranges from .010″ to .015″ on the flanges and .020″ on cylindrical diameters.

A special fine pitch milling cutter is used for this work and the work is rotated during the cut but at lower speeds than for grinding. These cutters wear very slowly and may be sharpened on ordinary shop equipment. The gradual wear materially reduces machine adjustments.

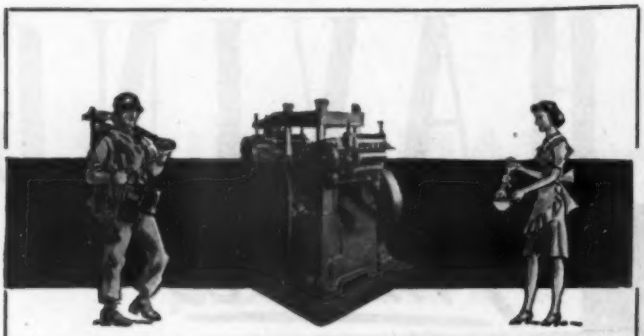
NATIONAL BROACH AND MACHINE CO.

RED RING PRODUCTS

5600 ST. JEAN • DETROIT 13, MICH.

Specialists on SPUR AND HELICAL INVOLUTE GEAR PRACTICE

Originators of ROTARY SHAVING AND ELLIPTOID TOOTH FORMS



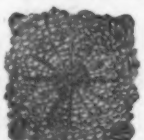
A war-time champion ready for Peace-time Production

The users of Dieing Machines who have been producing ordnance and airplane items at record-breaking rates, are in an enviable position to switch into peace-time stampings. Kitchenware, hardware, jewelry, toys, novelties; electrical, automotive and airplane items; an endless variety of stamped parts are needed in tremendous quantities to fill pent-up consumer demand. Dieing Machine owners are able to produce these at record low cost.

At speeds up to 600 strokes per minute, these machines produce 1 to 20 COMPLETE stampings per stroke, including intricate pieces involving 8 or more operations of blanking, forming, piercing, extruding, drawing, coining and broaching. Accuracy of product can be held within .0002" limits. Capacities: 10 to 300 tons.

Request Catalog 44

Can opener blade produced at new high rate



Novelty jewelry pierced piece produced on Dieing Machine

Motor base produced complete one per stroke from 16 gauge steel. Dimensions: 6¾" x 5" x 1¾"

THE HENRY & WRIGHT MFG. CO.
464 Windsor St. Hartford 1, Conn.

Henry & Wright

AUTOMATIC MACHINERY DESIGNERS AND BUILDERS

The AIR-MASTER sucks dust and grit right off the whirling wheels of grinders and buffers. Keeps the air free from these flying destroyers of health and machinery. Insures against their injuring the lungs of your employees and causing breakdowns of expensive machinery by getting into sensitive moving parts.

The AIR-MASTER is fully self-contained—efficient, rugged, dependable. A size for every grinder and buffer. Write today for full details.

NOW AVAILABLE:
Two, three and five H. P. grinders and buffers on AA5 priority or better

The Cincinnati
ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS
The Cincinnati Electrical Tool Co.
DIVISION OF THE R. K. LEBLOND MACHINE TOOL CO. CINCINNATI, OHIO
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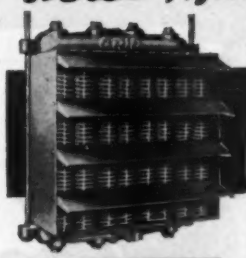
Here's Maintenance Free Heating Service-



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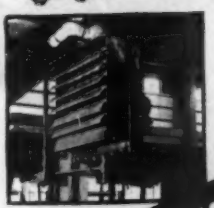
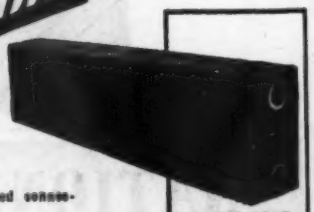
Built to last—to stand wear as long as the pipes that furnish steam to them . . . proven by many plants that have operated them continuously for as many as 15 years, without maintenance expense. As one machine shop reports, "Grid is the ideal unit heater for machine shops. We have operated GRID units in our plant for 10 years without any maintenance expense".



HERE'S WHY



- One piece construction heating sections (patented) of high test cast iron that withstand steam pressures up to 250 lbs.
- No soldered, brazed, welded or expanded connections to become loose or develop leaks.
- No electrolysis to cause corrosion, breakdowns, leaks, or heating failures.

Instant GRID for permanency in your plant. Complete data and capacity tables upon request.

HIGH TEST CAST IRON HEATING SECTIONS

D. J. MURRAY MANUFACTURING CO.
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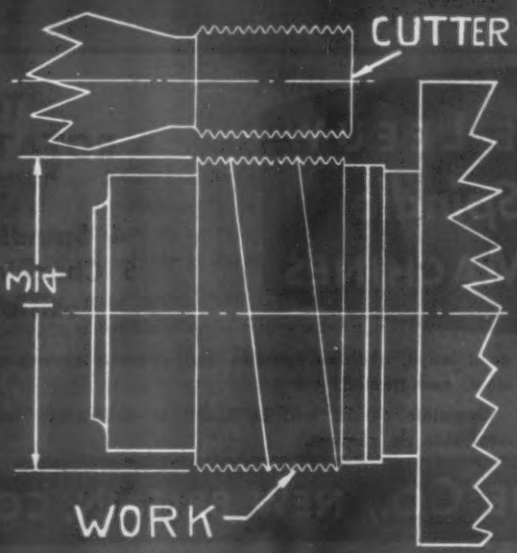
GRID

PLAN-O-MILL

Does it . . . with TWICE *the Speed—* HALF *the Manpower*



16 PITCH
.375 LEAD

We've said it before. We say it again. Obsolete machines are wasteful.

Notice the relatively small, solid, low-cost cutter used to mill this external thread. Plan-O-Mill rapidly and accurately mills this sextuple thread in a single revolution of the milling cutter around the work!

For thread milling, for cylindrical forming—internal or external—Plan-O-Mill delivers outstanding accuracy, superior finish, and most profitable production. One operator handles two or more Plan-O-Mills.

Replace those obsolete machines with Plan-O-Mills! Contact your machinery dealer or write direct.

"FIRSTS" WITH PLAN-O-MILL

First to install General Electric's remarkable new Thy-mo-trol electronic feed control!

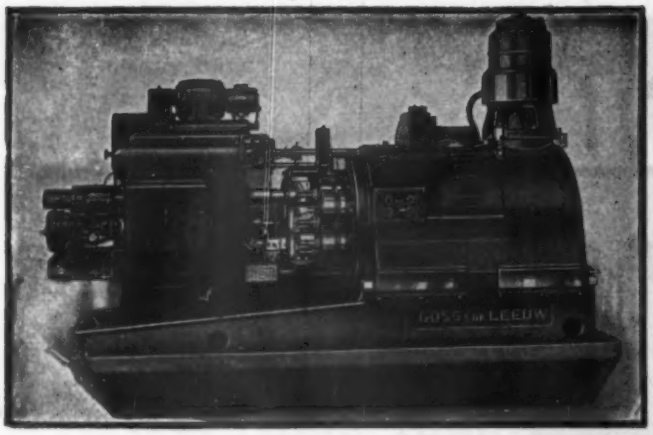
First planetary to mill external threads with standard multiple thread cutter!

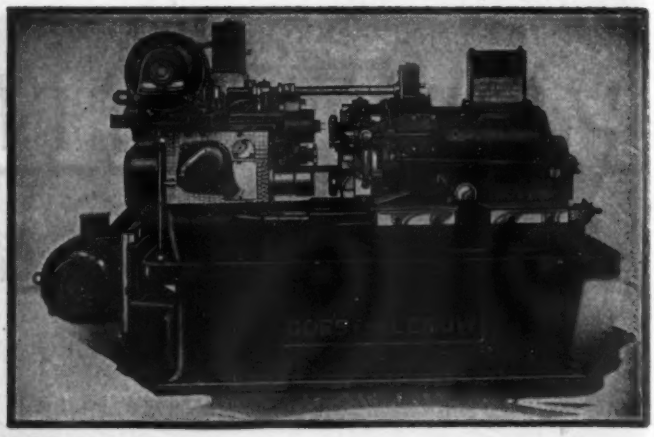
First planetary to coordinate feeds and speeds!

First to provide absolute control of feed-in!

PLAN-O-MILL
CORPORATION

1511 East Eight Mile Road • Hazel Park, Michigan





WORK ROTATING TYPE

5 Spindles
6 Spindles
8 Spindles

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES

TOOL ROTATING TYPE

4 Spindles
5 Chucking Positions

On these machines, two threading operations can be handled simultaneously, each thread controlled by its own lead screw.

Among the many other modern features offered in both types are: pre-loaded anti-friction spindle bearings, hardened ways, oversize spindles and gears of chrome-nickel steel, heat-treated.

Complete details will be found in descriptive catalog available on request.

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

KEYSEATING
The Modern Way

Illustration shows typical set-up for cutting taper keyways with table tilted.

Machines are made in three sizes for keyways 1/16" to 1¼" in width.

Great simplicity and ease of operation of Davis Keyseaters assure the user of accurate, time saving work.

Let our engineer study your keyseating problems.

DAVIS KEYSEATER COMPANY
403 EXCHANGE ST. ROCHESTER, N. Y.

"Ask ETNA about Swaging"

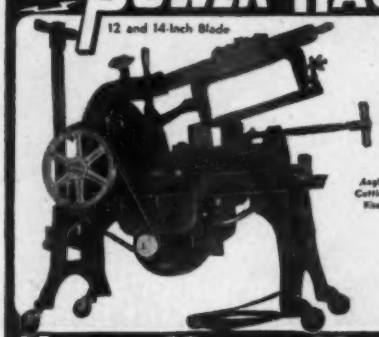
● If you have a production phase that calls for tapering, sizing or reducing of solids or tubes, you can save money if you "ASK ETNA ABOUT SWAGING." The superior performance of ETNA machines assures you more pieces per hour at lower cost. Built in capacities of ⅛" to 4" . . . larger sizes built to order!

Ask for our swaging catalogs

The ETNA MACHINE Co.
3400 MAPLEWOOD AVE. TOLEDO, OHIO

POWER HACK SAW ★

12 and 14-Inch Blade



LOW PRICED
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PORTABLE
SELF-CONTAINED
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READY TO WORK
STURDY
ECONOMICAL

Angle Cutting Vise

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MILLER-KNUTH MFG. CO. OMAHA, NEB.

NEW HEAVY DUTY GEARGRIND FORMED WHEEL GRINDER

GEARGRIND Type 24-48 handles either coarse or fine pitch gears with diameters up to 24", and 48" between centers. It is mounted on an extremely heavy base and the grinding wheel column is exceptionally rigid.

Production has been more than doubled with this machine, due to a combination of many advanced features which include much faster indexing, more rapid travel of the work table to and from the work, simplified push button controls and operator convenience.

The low base provides a low center line of the work. Work areas are painted spot light buff. The result is better visibility, easier, faster inspection, and increased safety for the operator.

GEARGRIND Type 24-48 is a noteworthy addition to our complete line of machines for the Formed Wheel Grinding of external and internal gears, external and internal involute splines, straight splines, serrations and racks. Catalog on request.

FEATURES

Indexing at both ends of stroke or tail stock end only.

Index cycle stop selection from 0 to 400, adjustable at any point in cycle.

Pre-determination of time for trueing wheel and automatic travel of grinding wheel carriage to wheel trimming position.

Electric safety circuit stops all carriage movement in case of index failure.

Motor driven work head spindle permits checking work runout with indicator.

Takes either 4 to 1 trimmer for coarse pitches or 6 to 1 trimmer for fine pitches.

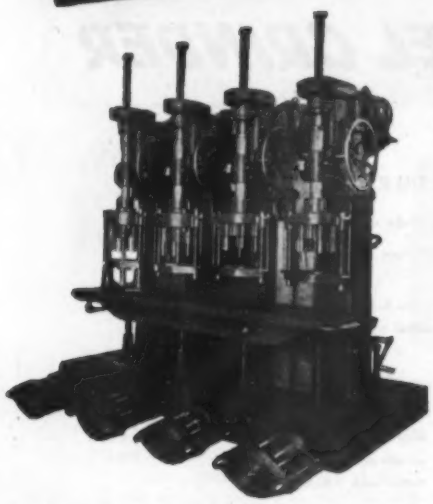
All piping and pump at rear, enclosed in removable cover for easy access.

TYPE GG 24-48

GEARGRIND
DETROIT U.S.A.
Manufacturers of the RZEPPA Constant Velocity Universal Joint.
The GEAR GRINDING MACHINE COMPANY
DETROIT 11, MICH. U.S.A.

Versatility of HOEFER HEADS

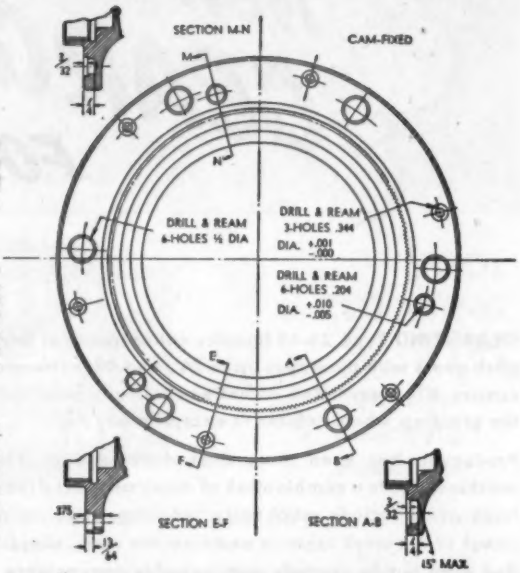
Speeds Production in Many of America's Armament Plants



• The line drawing shows a typical job done by HOEFER Multiple Spindle Heads. The machine at left drills and reams 15 holes in three different diameters and to three different depths.

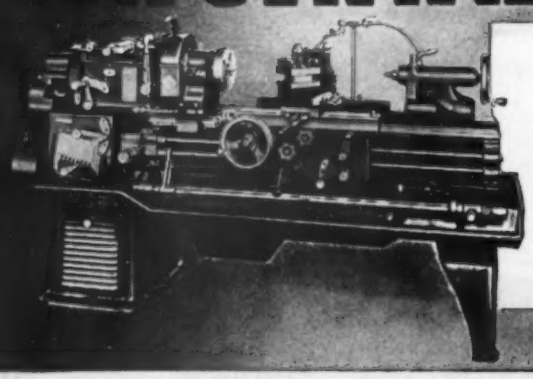
• HOEFER Heads used for such important work as that of armament production adds further proof to the ability of these heads to simplify the drilling of holes in multiple and to speed up the work. Also it suggests the great value these heads can be to you in your post war production.

• Due to our long years of experience in producing multiple spindle heads for a wide variety of applications we are in position to study your problem and suggest the correct head to fully meet your production need. Send us your blueprints and number of parts you need for one day. Save on the purchase of costly drilling equipment.



Hoefer's Whole Business is Holes . . . . **HOEFER MFG. CO.** *Freeport, Ill.*

CINCINNATI LATHES



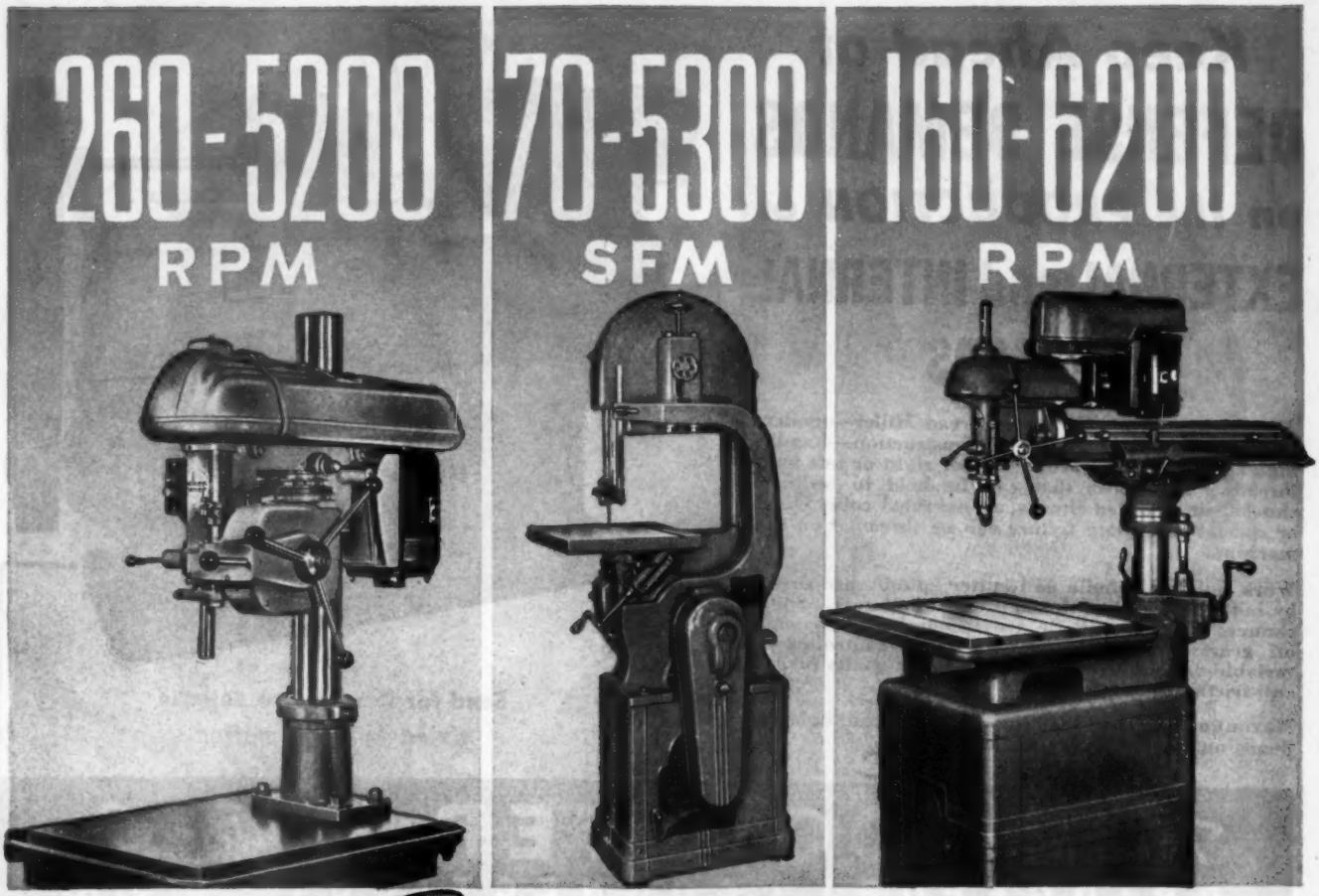
CINCINNATI ENGINE & TOOL ROOM LATHES
HIGH ACCURACY ASSURES
PRECISION PERFORMANCE

Cincinnati Lathes can be depended on for close tolerance work because they are designed and produced for accuracy under the most exacting demands. Headstock gears are precision made and hardened and ground; spindle is anti-friction mounted; ways and carriage are hand scraped; bed is sturdy and stiff.

Request complete details and specifications of Cincinnati Lathes—in sizes from 14" to 30".

THE CINCINNATI LATHE & TOOL CO.
Rogers Road, Oakley SPECIALISTS SINCE 1906 Cincinnati, Ohio

. . . the "Science of Application" . . .
brings out the best in cutting fluids!



GET THE *Correct* CUTTING SPEED
WITH WALKER-TURNER MACHINE TOOLS!

Every material — every operation — has its proper speed . . . the speed at which machining is done most accurately, most economically, most efficiently.

Walker-Turner Machine Tools — because of their exceptionally wide ranges of cutting speeds — enable production men to hit the correct speed "on the butto n"! This gives Walker-Turner Machine Tools versatility for handling all materials in all types of operations . . . from every-day production to complicated, special tooling set-ups. These qualities may prove the answer to your own problems. Write for our catalog today!

WALKER-TURNER CO., Inc., Plainfield, N. J.

Walker-Turner
Machine Tools Offer These Advantages:

- Versatility
- Rugged construction
- Safe, simplified operation
- Low power consumption
- Low capital investment
- Low operating and maintenance cost

RADIAL DRILL — Drills to center of 62" circle. Head tilts 45° right or left. Maximum distance nose of chuck to table, 13½". Spindle traverse, 3¾". Chuck capacity, ½".

METAL-CUTTING BAND SAW — 14" and 16" models. Geared speed reducer. Table tilts to 45° and has mitre gauge groove. Blade tensioning device has spring cushions to absorb shocks.

20-INCH DRILL PRESS — Hand or power feed. Bench or floor, single or multi-spindle models. Drills to center of 20" circle. Feed 6". Capacity 1" in cast iron, ¾" in steel.

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MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

Keep Ahead of
DEFENSE DEMANDS
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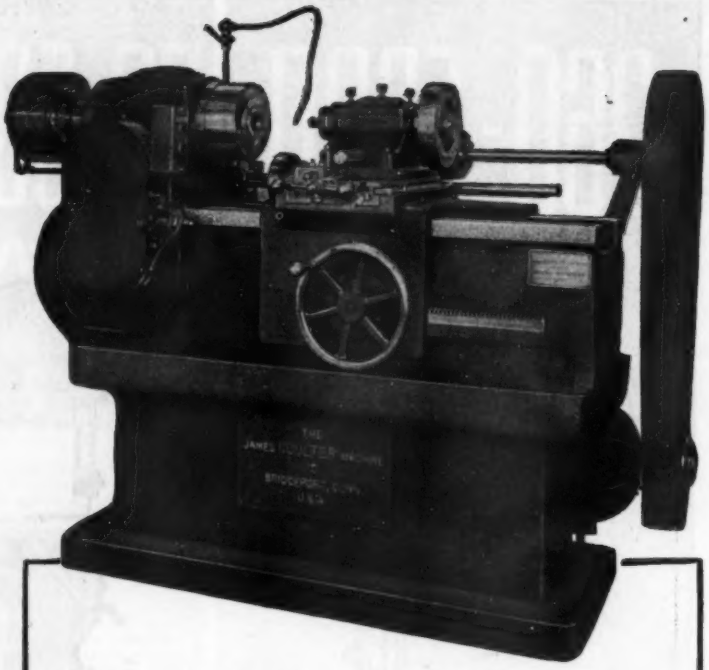
EXTERNAL and INTERNAL THREADS

The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7"; minimum hole depends on smallest hob practical.



Send for Descriptive Bulletin giving full information.

The James COULTER *Machine Co.*
BRIDGEPORT · CONNECTICUT · U.S.A.

PORTAGE

NO. 4

HORIZONTAL BORING DRILLING & MILLING MACHINE

• Designed and built to meet the need for speed and accuracy demanded of today's production.

WRITE TODAY

for fully illustrated bulletin giving detailed description of the many features of this Horizontal Boring, Drilling and Milling Machine. No obligation.

THE PORTAGE MACHINE CO.
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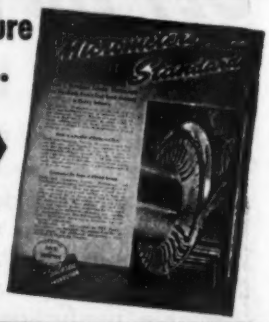
How to Accurately Measure Large* Unwieldy Parts...
* Up to 168"

...is explained in this **FREE BOOKLET**



Write for your copy today. Learn how D&T Tubular Micrometers and Standards can be applied as accurately to the measuring of work up to 168" as ordinary micrometers are to small precision parts.

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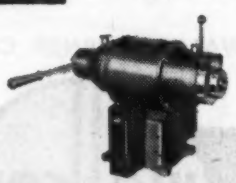
SCHAUER Speed Lathes

WRITE FOR CAT. 440



Ideal for secondary finishing operations on small metal and plastic parts • polishing • deburring • lapping • grinding.

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ORIGINATORS OF TODAY'S SPEED LATHES
2067 READING ROAD . . . CINCINNATI 2, OHIO

READY FOR EARLY DELIVERY!

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No. 1½

HAND FEED SURFACE GRINDER

Abrasive No. 1½—the ideal machine for short-run precision jobs—produces the finest type of flat, form and gage grinding.

Large capacity, 15" long x 10" wide x 12" high; motor and spindle integral, without belts, chains or dangerous moving parts; convenient handwheels for effortless operation. Women operators readily produce work of extreme accuracy. Send for Bulletin.

ABRASIVE MACHINE TOOL COMPANY — EAST PROVIDENCE 14, R. I. *Dealers in Principal Cities*

FASTER CUTS

CLEANER CUTS

STRAIGHTER CUTS

Save Time

Save Costs

assured by the PORTER-McLEOD COLD METAL SAWING MACHINE

Valuable time on war work can be saved by the 8" Porter-McLeod high production machine on all classes of work.

Its rating as a truly high production machine is the result of design features which make it possible to nest bars or shapes for multiple cutting, a method of holding the work securely during fast feeds, a unique upward blade movement through stock and a saw design which provides cutting action by every tooth.

These features result in remarkably fast, clean, straight cuts. Sturdy construction and ample power contribute to its ability to handle a standard feed of 3" per minute. Capacity: 8" round or 7½" square stock.

Explore the possibilities of the 8" Porter-McLeod Machine on your high production cold metal sawing operations. *Write today for Descriptive Bulletin.*

PORTER-McLEOD MACHINE TOOL CO., INC.

HATFIELD, MASS., U. S. A.

LEACH External Grinder

PRICE

$875.00

Fully Equipped

Our dealers will help you fill out necessity priority forms.

Write us today for your nearest dealer's name and address.

Grinds Work from ¾" to 11" in length and from ⅛" to 7" in diameter.

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LUCAS "PRECISION"

Horizontal Boring, Drilling and Milling Machine

THE LUCAS MACHINE TOOL CO.

NOW AND ALWAYS OF

CLEVELAND OHIO, U. S. A.

For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

Giant KEYSEATERS

MITTS & MERRILL

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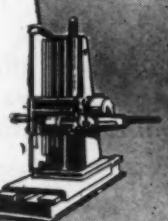
Saginaw, Michigan

GILBERT

PRODUCTION SPEEDING RADIAL DRILLS AND HORIZONTAL DRILLING, BORING AND MILLING MACHINES



DETAILS ON REQUEST

THE CINCINNATI GILBERT MACHINE TOOL CO.

CINCINNATI, OHIO

SPEEDY SPINDLES THAT CRY... "LET'S GO"

. . . and you can locate them at will around the BODINE horizontal automatic indexing dial, to operate vertically, horizontally, at an angle, or from inverted positions. The operator merely places the part in a clamping fixture and it is indexed to as many as 8 working stations . . . each performing a different operation during one cycle of the dial. This is FAST, accurate production which saves man-hours, conserves floor space, reduces costs to a minimum . . . even with the use of a semi-skilled operator.

DRILLING, MILLING, TAPPING, SCREW INSERTING *Simultaneously*

American industry has a responsibility to returning service men who must be re-employed. Because the Bodine machine is so easily operated, green hands may be quickly trained, and injured veterans can do this clean, healthy work without undue fatigue. Electrical interlocks protect the machine, the tools and the operator. Older men and women are doing a fine job in war work in maintaining high production schedules on Bodine machines.

It is not possible to describe the many advantageous features of the Bodine principle of design in this space, so we suggest that you obtain the Bodine Bulletin which covers all details. If you are using several machines, several operaors and considerable floor area to process one specific part, it may be well worth while to investigate the possibility of combining *all* operations in this single unit. Competitive advantage in civilian production may be gained by such action.

Bodine automatic dial machines have from 6 to 8 spindles, each of which may be operated at a different speed, up to 20,000 r.p.m. Drilling and tapping capacity includes the smallest commercial diameters up to ½" and to 3" in depth . . . depending upon the model size.

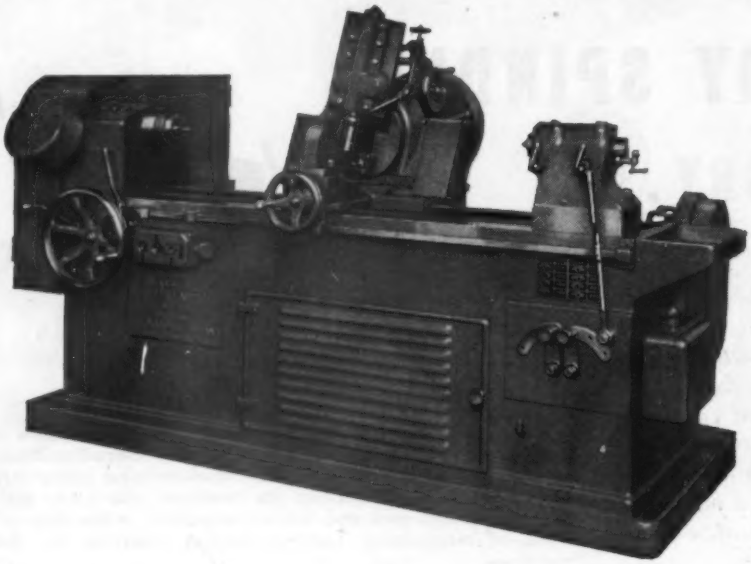
Bodine engineers will analyze your production from blueprints or sample parts and recommend a dial and tooling set-up specifically designed to speed production and lower costs. Manual feed is general and ejection may be either automatic or manual. In some cases even feed may be automatic.

SIX STANDARD SIZES, WIDE RANGE OF SET-UPS

Bodine machines range from the No. 40-10 to the larger 48-30 and require floor space from 54" x 60" to 90" x 96". They accommodate from 6 to 8 spindles . . . can be adapted to a great variety of dial and tooling set-ups. (No. 48-30 shown processing armament components.)

THE **Bodine** CORPORATION
BRIDGEPORT CONNECTICUT

AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES



The ADAMS Gear Hobber and Thread Miller

The Adams Manufacturing Hobber is available when there is a sufficient volume of splined shaft and spur gear hobbing to warrant the purchase of equipment for these operations only.

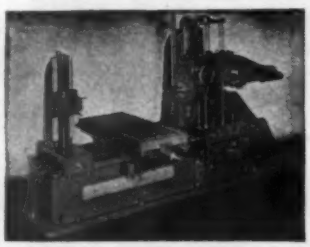
Here is a machine that combines precision with versatility. It hobs multiple splined shafts, spur gears and helical gears, and it will mill worm and screw threads.

THE ADAMS COMPANY
1905 BRIDGE STREET
DUBUQUE, IOWA, U.S.A.

1883 — Our 61st Year — 1944

UNIVERSAL *Horizontal Boring Machine*
The only TRIWAY *Boring Machine Built*

Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.



Standard Universal 3" Spindle Machine

UNIVERSAL BORING MACHINE CO.
Hudson, Mass., U. S. A.

Sensitive DRILLING MACHINES
Avey
CINCINNATI OHIO

SMITH & MILLS
CRANK SHAPERS
sizes 12" to 32" stroke
THE SMITH & MILLS CO. Cincinnati, Ohio

How to apply the HORIZONTAL ROTO-MATIC for increased Drilling Production is described

in this
FREE BOOKLET

Learn how the Roto-Matic principle of continuous operation can be applied to your drilling, boring, reaming, facing, milling, etc., requirements and result in increased production. Write today for this booklet describing the many adaptations and advantages of the Roto-Matic.
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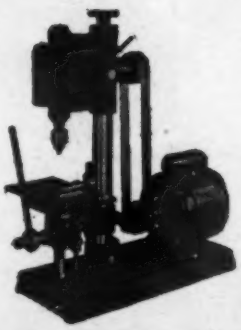
HAMILTON-MUEHLMATT



. . . for Speeds Sensitive Tapping

A high production sturdy little machine particularly suited to precision tapping of light work such as instruments, cameras, watches, clocks and business machines. Sensitivity of operation, and high spindle speeds account for accurate work without breakage of fine taps. Can be attached to any light socket. Write for complete information.

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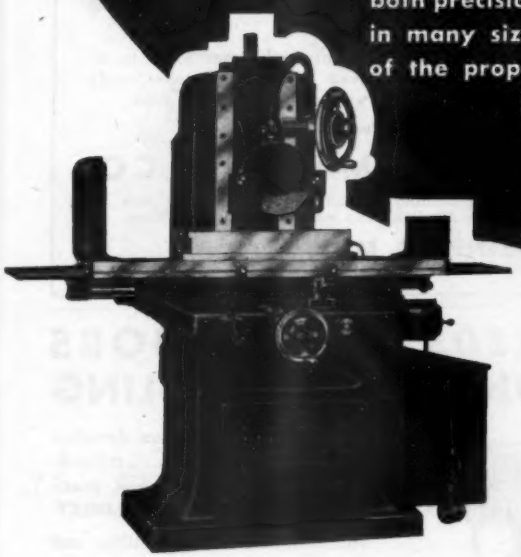
HAMILTON OHIO

GRAND RAPIDS
HYDRAULIC FEED SURFACE
Grinders

GALLMEYER & LIVINGSTON COMPANY is today building what is without question the finest, smoothest, and fastest Hydraulic Feed Surface Grinders of their entire career — a direct result of over 35 years of experience in the design and production of high grade precision grinding machinery. These machines are manufactured in both precision tool room type and production type in many sizes with the result that there is one of the proper size and type to best meet your particular requirements.

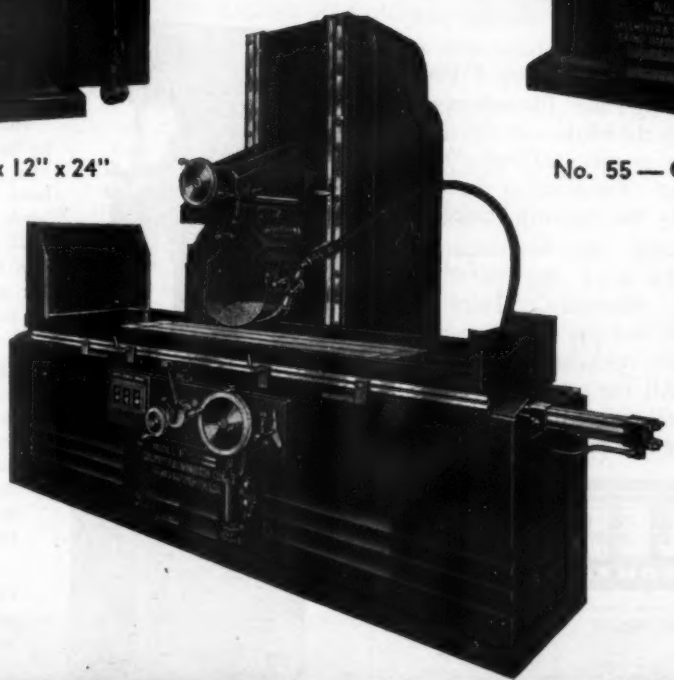


No. 35 — Capacity 8" x 12" x 24"

No. 55 — Capacity 12" x 17" x 36"

Precision Tool Room Type Machines

This is the type of GRAND RAPIDS Hydraulic Feed Surface Grinder on which one prominent machine tool builder obtains a 5 micro inch finish operating machine at 125 feet per minute. They are illustrated and described in bulletin GL-100.



Production Machines

GRAND RAPIDS Production Type Hydraulic Feed Surface Grinders manufactured by the GALLMEYER & LIVINGSTON COMPANY are designated as Model F and Model A and feature the use of wide faced wheel and cross traveling head. GRAND RAPIDS Production Type Hydraulic Feed Surface Grinders are illustrated and described in bulletin GL-4-1-43. Write for your copy today.

GALLMEYER & LIVINGSTON CO.

330 STRAIGHT AVE. S.W.

GRAND RAPIDS, MICHIGAN

PEERLESS *Presents* THE NEW MECHANI-CUT

A Fast, Accurate Saw with Full Mechanical Drive and Four-Sided Saw-Frame!

THE MECHANI-CUT is the metal cutting saw that production men have wanted. It is built part by part, and assembly on assembly, to last with minimum attention. It has the famous Peerless Patented Four-Sided Saw-Frame with Backing-Plate Blade-Support. The Saw-Frame fully surrounds the blade and the work. The compensating Feed Unit is mounted away from falling chips and coolant spray. Pressures to the fraction of a pound are selected by the fingertip control.

Check all the desirable features! See how capacities of 7" x 7"—11" x 11"—and 14" x 14" meet the widest range of metal-sawing needs. Mechani-Cut helps you wind up existing contract work and ties right into post-war tooling plans. A manually-operated conveyor can be added right on the job. All the good news is contained in a colorful, new bulletin—MC-51. A note on the coupon will reserve your copy.

PEERLESS
MACHINE COMPANY
RACINE · WISCONSIN

☐ **RUSH MY COPY OF BULLETIN MC-51** Dept. AM-1044

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☐ Peerless Vertical for Die Block Work
☐ Hydra-Cut High Production Saws
☐ Utility and Maintenance Saws

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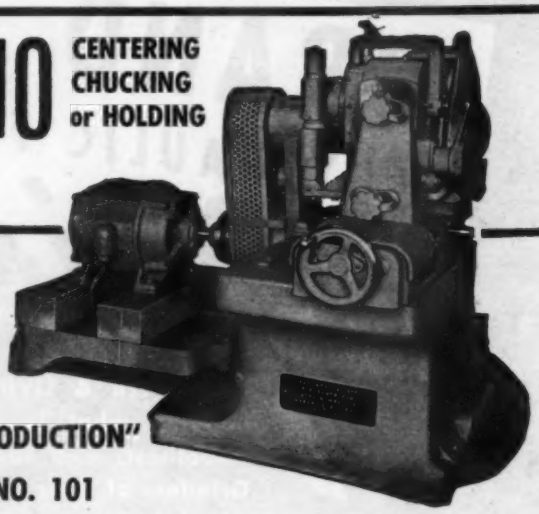


with the

"PRODUCTION" NO. 101

CENTERLESS FEED POLISHING MACHINE

More and better finishing of cylindrical work at lower cost is assured by this machine even in the hands of inexperienced operators. Work is fed automatically, an index showing position of the feed at all times.

This machine will handle cylindrical work from 1/8" to 6" diameter and is ideal for superior polishing of tubes, rods, bars, etc. Wheel can be trued with machine in operation.

Send for folder giving full detailed information.

PRODUCTION MACHINE CO.

Manufacturers of Drilling Machines, Tool Grinders and Hand and Automatic Polishing and Grinding Machines.

GREENFIELD, MASS., U. S. A.

HUNDREDS of ODD JOBS FOR CONVERSION TOOLING

. . . that's the situation fast developing throughout industry . . . a condition that calls for small, fast, precision machines such as the LINLEY.

This compact, vertical Milling and Jig Boring Machine, designed to take over the important odd jobs and relieve larger equipment for its rated work, will earn its keep from the start. Die work, jigs, model and pattern making, drilling, boring, reaming, etc., quickly and accurately performed at low cost.

FEATURES include: 8 speeds to 4250 r.p.m., velvet feed, micrometer screw head, counterbalance to remove backlash from quill travel, grease-sealed bearings, streamlined design, yet with all controls easily accessible, generous table travel, small floor space required (18½"x20").

The fast set-up and easy changeover enable operators to maintain shop schedules, prevent work tie-ups.

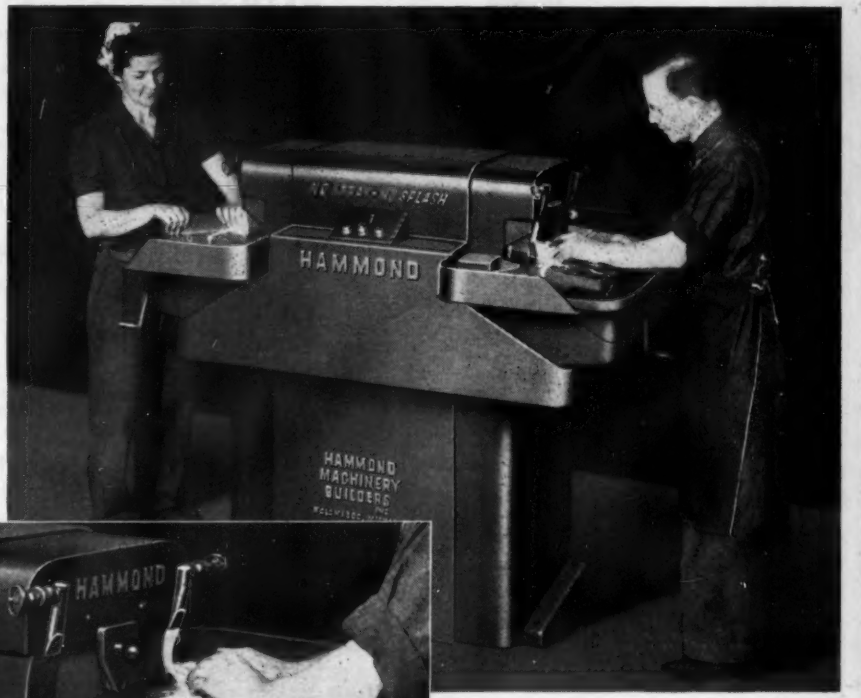
SEND FOR BULLETIN

LINLEY BROTHERS COMPANY
664 STATE ST. EXTENSION
BRIDGEPORT 1, CONN.

Hammond CARBIDE TOOL GRINDERS

MOST COMPLETE LINE — *For Grinding Chip Breakers . . . Rough and Finish Grinders*

Hammond can furnish you the right grinder for your particular needs. 20" straight wheel wet grinder for high production grinding, 14" cup wheel grinders for tools of 1" shank or larger, 10" cup wheel grinders for tools up to 1" shank; 6" cup wheel grinders for rough grinding tools up to ⅝" shank, also an ideal finishing grinder for all size tools. Hammond can give you grinders for either wet or dry operations. *Your inquiry is invited—write today for bulletin 201-A.*



Hammond HEAVY DUTY CHIP BREAKER and DIAMOND FINISHING GRINDER

Hammond 6" CUP WHEEL ROUGHING and FINISHING GRINDER

New . . . Superior . . . Exclusive Features!

1. YOU'RE DRY WHEN YOU GRIND WET—*Scientifically designed No Spray—No Splash guards patented, standard equipment, and coolant flow control keeps the operator and floor dry.*

2. SAFETY CUP DISC—*All Hammond cup wheel grinders furnished with patented safety cup discs as standard equipment. It is the greatest safety unit ever installed on any carbide tool grinder . . . prevents operator getting fingers, or dropping tools, into cup of cup wheel.*

3. FULL VIEW OF WORK—*Maximum light and fullest operating freedom provided by latest engineering developments. No Spray—No Splash Guards are concealed and close to the wheel . . . safety cup discs recessed into cup of cup wheel move with table and wheel hood for wheel wear.*

4. HEAVY DUTY CONSTRUCTION—*Smooth, vibrationless grinding is assured through precision spindle construction incorporating oversize spindle and oversize bearings. All moving parts are wear-protected for long dependable performance.*

14" WET and DRY CARBIDE GRINDERS

LARGE WHEELS FOR FAST CARBIDE TOOL GRINDING

NO SPRAY — NO SPLASH

CONCEALED WHEEL GUARDS

FULL VISIBILITY OF WORK

GREATER OPERATOR FREEDOM

SAFETY DISC IN CUP WHEELS

ADJUSTABLE COOLANT CONTROL

WRITE FOR BULLETIN 201-A

Hammond Machinery Builders INC.

1618 DOUGLAS AVE., KALAMAZOO 54, MICH.

EASTERN BRANCH: 71 W. 23rd ST., NEW YORK 10, N. Y.

Bridgeport

TURRET MILLING MACHINE
. . . the all-purpose machine with unparalleled range of utility

This machine will mill, drill, bore and shape at all conceivable angles. All angular settings in one plane are achieved by merely turning hand wheel controlling keyed overarm. It has always been furnished with the well known Bridgeport High Speed Milling Attachment which provides for drilling and boring at all angles without changing work setup.

Column, knee and table are of rugged construction. Wide ways and taper gib assure accurate, vibration-free operation. Entire machine is anti-friction bearing mounted.

NOW EQUIPPED WITH NEW SHAPING ATTACHMENT

This new attachment on back end of overarm is of sturdy construction and can be set at all angles. It provides for shaping such work as large and small dies and molds as well as for intricate production jobs involving slotting operations.

The "Bridgeport" Shaping Attachment is now available to every owner of Bridgeport Turret Milling Machines. Shaping and Milling Attachments can be mounted on all types of milling machines. They are in extensive use on special production equipment.

CONDENSED SPECIFICATIONS

Longitudinal Feed—20"
Cross Feed—9"
Vertical Feed of Knee—16"
Table—9" x 32"
Spindle Speeds—(Milling Unit) 275, 425, 700, 1050, 2100, 4250

WRITE FOR ILLUSTRATED BULLETINS GIVING FULL DETAILS

THE BRIDGEPORT MACHINES, INC.
Bridgeport, Conn.

INVESTIGATE Tannewitz DI-SAWS and You'll Want No Other!

Larger wheels (24" diameter on the standard models) provide greater traction, faster, straighter cutting, more production. Transmissions, common source of die saw grief, never fail in TANNEWITZ DI-SAWS. Sturdier, heavier construction throughout, plus many refinements of design, make these machines the greatest trouble-free producers in their field. It pays to buy the best!

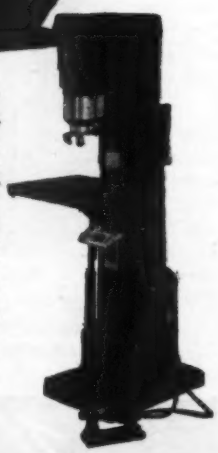
With a TANNEWITZ DI-SAW you can do in minutes jobs which require hours by the shaper, miller or lathe methods; and there are models to accommodate work of practically any size. Get the facts. Write for "DI-SAW Bulletin".

STANDARD MODEL No. M24 (24" WHEELS)

Other Bulletins Worth Sending For:
"SINGLE AND VARIABLE SPEED BAND SAWS FOR FOUNDRY USE", "SHEET METAL CUTTING BAND SAWS". Just a line will bring them promptly.

THE TANNEWITZ WORKS, GRAND RAPIDS, MICH.

THE *Right* MACHINE
THE *Right* FIXTURE



Insure continuous, trouble-free tapping production The HASKINS Way, combining Haskins AIR CONTROL with the right fixture. Add Piece Part Control and you approach completely automatic tapping. Placing the part in the fixture actuates a micro-switch—AIR does the rest. Each piece is tapped uniformly, precisely—faster than by any other method. For complete information on high speed tapping The Haskins Way, send for our latest catalog. R. G. Haskins Co., 2761 W. Flournoy St., Chicago, Ill.

HASKINS haskins
PRECISION TAPPING EQUIPMENT

NO TOOL CONVERSION PROBLEM

With VASCOLOY-RAMET TANTALUM-TUNGSTEN STANDARD CARBIDE TOOLS

LIKE MONEY IN THE BANK

List your Vascoloy-Ramet Standard (Tantalum-Tungsten) Carbide Tools among your prime assets. These Tools have established many war-time production records and will continue to serve as efficiently in peace-time production.

Vascoloy-Ramet Standard Carbide Tools will perform the majority of carbide tool operations. Use them for maximum speeds, for heavier cuts, heavier feeds. Get increased production, most profitable results.

Keep a good assortment on hand; be ready to swing into peace-time production with the "World's Finest Carbide Tools." Check your stocks now!

• WORLD'S FINEST CARBIDE •

Ramet

VASCOLOY RAMET CORPORATION

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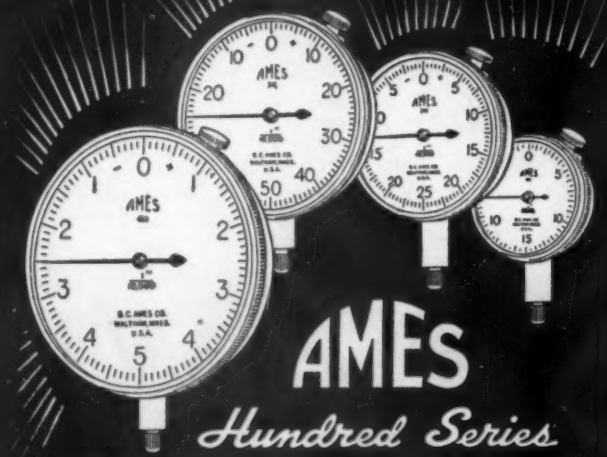
NORTH CHICAGO • ILLINOIS • SALES AND SERVICE IN PRINCIPAL CITIES

4 Sizes ~ 14 Dial Faces



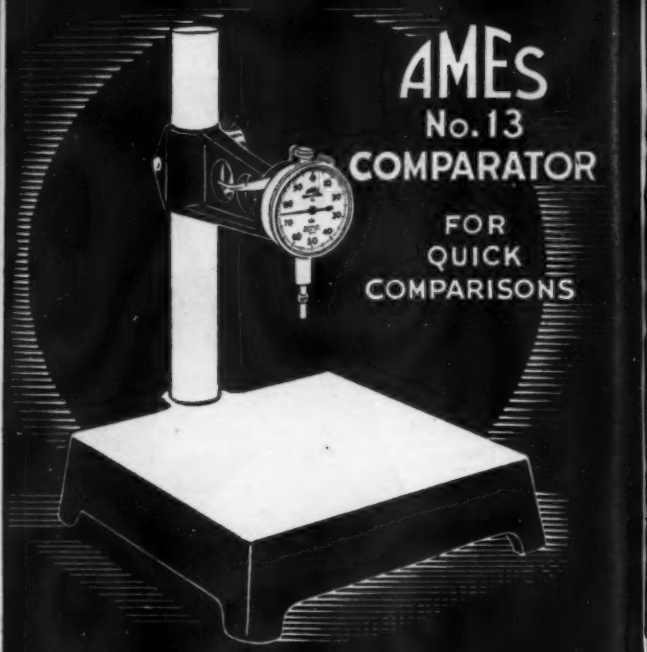
AMES
Hundred Series
DIAL INDICATORS

In four sizes with fourteen different dial graduations, indicating thousandths, half-thousandths or tenths of thousandths inches.

Speedy, accurate, inexpensive and adaptable to various measuring and testing jobs.

Write today for catalog.

FAST • ACCURATE

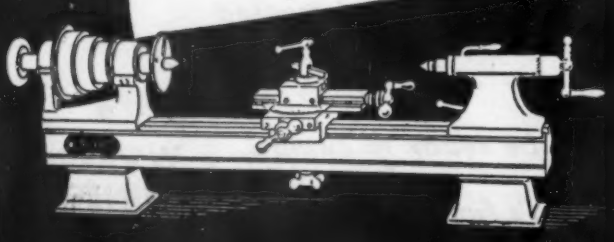


AMES
No. 13 COMPARATOR
FOR QUICK COMPARISONS

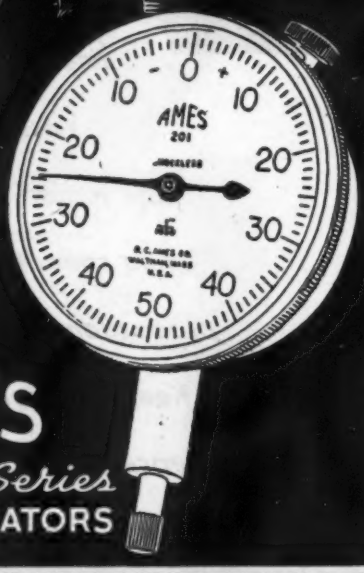
AMES *Precision* BENCH LATHE

Known for 40 years as a precision lathe of the highest quality. Bed 36" long. Ball bearing headstock uses 1" capacity collets. Swing 8 3/8" over bed. Available with motor drive.

Send For Catalog



Shockless in Four Sizes

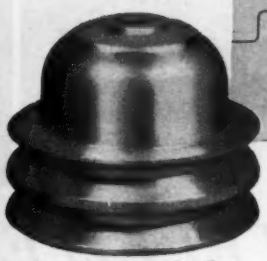


AMES
Hundred Series
DIAL INDICATORS

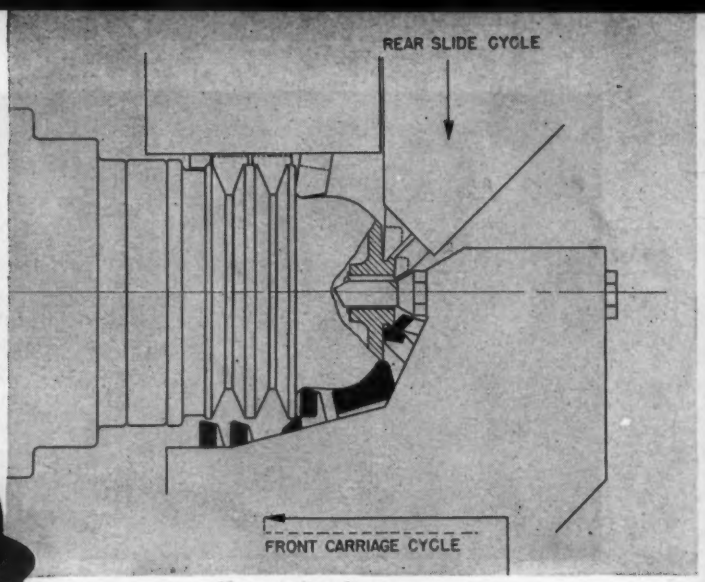
B.C. AMES CO. WALTHAM, MASS.

4 T.C. Tools Turn This ob In 1 Operation

ve, machining 14 surfaces simultan-ly on Sundstrand Automatic Lathe.



Above, finish turned pulley.



Above, tooling diagram.

TIME STUDY FACTS

TERIAL—Cast Iron.
RDNESS—Brinell 179-217.
NSILE STRENGTH—
4,000 lbs. P.S.I.
CHINE—Model 10 Sund-strand Automatic Lathe.
CUTTING TOOLS—100% Tungsten Carbide.
STOCK REMOVED—1/4" all over.

Feeds and Speeds

FRONT TOOLS

n O.D. of belt grooves and O.D. of radius iameter—Three T.C. tools.
n O.D. of small hub—One T.C. tool.
mfer hub—One T.C. tool.
mfer O.D. of front groove—One T.C. tool.
e shaft hole—One 1/4" S.S. tool bit and oring bar.
m large radius on head—One T.C. tool.
} .0054" feed

REAR TOOLS

n grooves—Two T.C. tools.
e head and undercut—One T.C. tool.
e and form radius—One T.C. tool.
mfer O.D. of rear groove—One T.C. tool.
e hub—One T.C. tool.
} .0045" feed

tools work together and speed slows down from 132 to 56 r.p.m. finishing. Cycle time of this job is 4.40 minutes, floor-to-floor.

Sundstrand Automatic Lathe Performs Facing, Turning, Grooving and Boring Operations Simultaneously . . .

Included in the numerous outstanding processing methods of the White Motor Company of Cleveland, Ohio, is this pulley machining job. It's an excellent example of the use of multiple tooling on high production turning.

The only previous machining on the pulley, besides drilling small hole in end, is to bore the inside diameter and face the open end surfaces for locating purposes. It is then completed on a Sundstrand Automatic Lathe. The machine is provided with an automatic cycle of rapid approach, feed, dwell, rapid return and stop. To improve finish, a two speed motor automatically reduces spindle speed as forming tools approach end of cut. The operator gages and checks the part and is free to do other work during the automatic machine cycle.

This is but one of many installations wherein a Sundstrand Automatic Lathe is used for profitable high production turning. *Due to its quick cycle change-over features and its ease of set-up it is also saving time on a great number of short-run turning jobs.* Our engineers will be glad to assist you in determining how this modern lathe can be profitably applied to your work. Call on them without obligation.

w to Lower Turning Costs

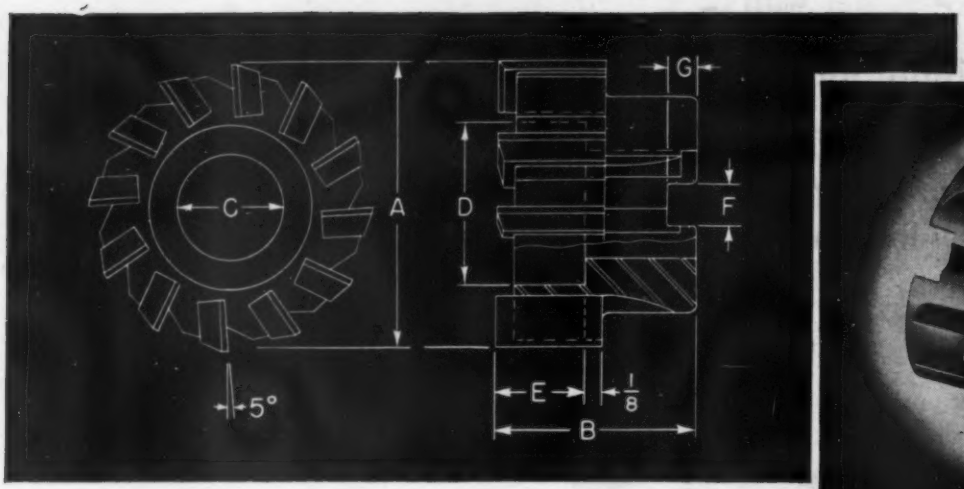
s free 44-page booklet contains ful tips on processing turning jobs, ether with illustrations and tooling rams. Complete engineering and duction data are given on many jobs similar to yours. Write for your free copy today. Ask for bulletin 129.

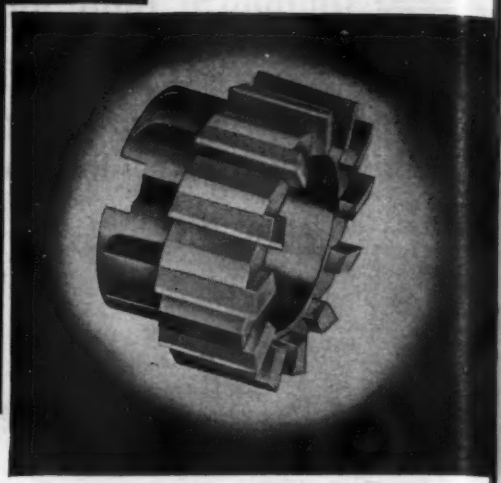
ARMY NAVY

SUNDSTRAND MACHINE TOOL CO.

Rigidmils • Fluid-Screw Rigidmils • Automatic Lathes • Hydraulic Equipment • Drilling and Centering Machines • Special Milling and Turning Machines

2533 ELEVENTH ST., ROCKFORD, ILLINOIS, U. S. A.





Use HAYNES STELLITE END MILLS *For Faster Milling!*

HAYNES STELLITE shell end mills with brazed-in blades are fine-pitch cutters developed for faster milling. These end mills are operated on cast iron, malleable iron and semisteel, with a chip load of 0.10 to 0.15 in. per tooth. They are also successfully used on mild steel with a load of 0.005 to 0.010 in. per tooth. On nonferrous metals, and on plastics, hard rubber, or fiber, the chip load is often increased to 0.030 inch.

These high-production tools are operated on light milling jobs at surface speeds as high as 300 ft. per min. on cast and malleable irons—600 ft. per min. on brass —1,200 ft. per min. on aluminum.

HAYNES STELLITE alloy cutters are finished according to the A.S.T.E. Simplified Practice Committee standards for milling cutters to fit standard arbor equipment. Sizes other than those shown in the table can be made upon request.

Diameter (A)	Thickness (B)	Hole (C)	Counterbore (D)	Counterbore (E)	Drive Slot (F)	Drive Slot (G)	Size of Blades	No. of Teeth
1 1/4	1	0.500	11/16	3/8	0.260	5/32	3/16 x 1/4 x 1/2	8
1 1/2	1 1/8	0.500	3/4	1/2	0.260	5/32	3/16 x 5/16 x 5/8	10
1 3/4	1 1/4	0.750	1 1/6	1/2	0.322	3/16	3/16 x 5/16 x 5/8	10
2	1 3/8	0.750	1 1/8	5/8	0.322	3/16	3/16 x 3/8 x 3/4	12
2 1/4	1 1/2	1.000	1 3/8	3/4	0.385	7/32	3/16 x 3/8 x 7/8	12
2 1/2	1 5/8	1.000	1 3/8	7/8	0.385	7/32	3/16 x 1/2 x 1	14
2 3/4	1 5/8	1.000	1 5/8	7/8	0.385	7/32	3/16 x 1/2 x 1	14
3	1 3/4	1.250	1 7/8	1	0.510	9/32	1/4 x 1/2 x 1 1/8	14
3 1/2	1 7/8	1.250	2 1/8	1 1/8	0.510	9/32	1/4 x 5/8 x 1 1/4	16
4	2 1/4	1.500	2 1/2	1 1/4	0.635	3/8	1/4 x 5/8 x 1 3/8	18

Send For Free Booklet

For more information on HAYNES STELLITE high-production cutting tools not only for milling, but also for turning, facing, boring, and other operations, write for the booklet "Operating Information on Haynes Stellite 98M2 Tools." Ask for F-5350.

HAYNES STELLITE TRADE-MARK

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York 17, N. Y. UCC Kokomo, Ind.

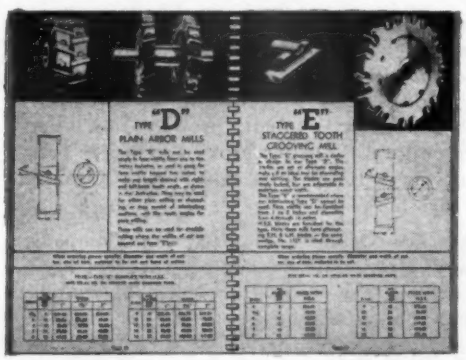
Chicago—Cleveland—Detroit—Houston—Los Angeles—San Francisco—Tulsa

• HIGH-PRODUCTION METAL-CUTTING TOOLS •

"HAYNES STELLITE" is a registered trade-mark of Haynes Stellite Company.

Have you your
LOVEJOY TOOL CATALOG?

There are 38 pages packed with illustrations and information like this!



If you have not already sent for the NEW Lovejoy Tool Catalog, mail the coupon today. This will bring you, without obligation, the *complete* story on *all* Lovejoy products. The new catalog has complete specifications, line drawings, prices, hints on grinding, parts numbers, etc., etc.— it will help solve wartime production problems, and help on post-war planning.

MAIL THE COUPON TODAY !

Please send me my free copy of "Lovejoy Modern Metal Cutting Tools."

NAME_____ TITLE_____

COMPANY _____

STREET _____

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A. M.

Lovejoy

TOOL COMPANY, Inc., SPRINGFIELD, VT., U.S.A.

The brush that recaps tires...

and helps make new ones

TIRE recapping, so vital an operation today, is best performed by using a special Osborn retreading brush for roughening the surface of the tire to get the maximum adhesion in vulcanizing . . . *without breaking the cords!* Tires thus prepared are uniformly and properly roughened . . . there are no weak spots, no broken cords . . . and the tires wear longer.

Power brushing has been *proven* during wartime one of the most versatile of all tools—used in practically every industry on every product for every surface finishing operation.

Moulds for making new tires, too, are best cleaned by power brushing—resulting in a better looking, better performing product. Tire valves are finished by brushing before they are bonded to the rubber. The resulting smooth finish leaves no ragged edges to injure precious inner tubes.

Whatever you make now—or intend to make in the future—*whether it's made of rubber, metal, fabric or plastic*—it will pay you to investigate the contribution that power brushing, as developed by Osborn, can make to your product. You'll get greater uniformity, better looks and better performance at a lower unit cost—with Osborn power brushing.

Write The Osborn Manufacturing Company now and a trained field engineer will make a study of your present and projected operations—without obligation.

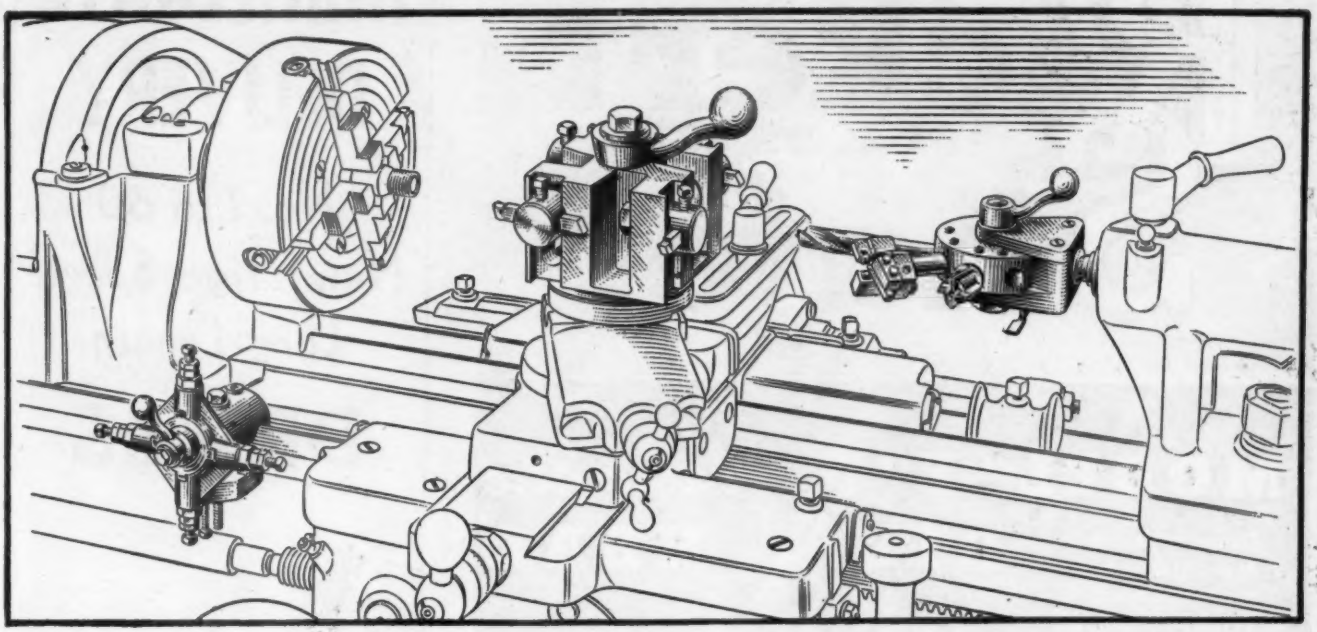
THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue *Cleveland, Ohio*

Osborn Brushes

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY

Turn your engine lathes into turret lathes...



simply attach these 3 time-saving devices!

THE CROSS-SLIDE TURRET gives you four-side working operations without tool changes . . . with little increase in machining time. Tying up only one lathe instead of four, you *multiply* the production capacity of your equipment many times. A SPECIALTIES Cross-Slide Turret is remarkably easy to operate—simply flip turret from one index position to another. A clamp lever locks it solidly. No. 30 for 9" to 11" lathes; No. 60 for 12" to 18" lathes.

THE TAILSTOCK TURRET quickly converts your present engine lathe into a 4-way turret lathe for end work. Machining costs are cut and efficiency increased when you can do four different operations—such as drilling, reaming, tapping, and counterboring – without time loss for tool changes. No. 58 with No. 2 Morse Taper Shank; No. 103 with No. 3 Morse Taper Shank; No. 104 with No. 4 Morse Taper Shank.

THE LATHE STOP enables you to measure only once for each operation, saving valuable time. Once the four measuring positions are set, it is only necessary to index. After that the SPECIALTIES Lathe Stop does the measuring. No. 10 for 9" to 12" lathes; No. 20 for 13" to 20" lathes.

No need to wait for turret lathes now! With these three time-saving tools attached to your lathe, you can do forming, roughing, boring, finishing, knurling, drilling, tapping—without stopping the lathe or losing time in changing tools. For full details on SPECIALTIES lathe accessories to speed production and reduce machining costs, mail the coupon.

SPECIALTIES
MANUFACTURING COMPANY, Inc.

SPECIALTIES Manufacturing Co., Inc.
50 Farrand Street, Bloomfield, N. J.

Please send me full information on SPECIALTIES lathe accessories.

Name_____

Company_____

Address_____

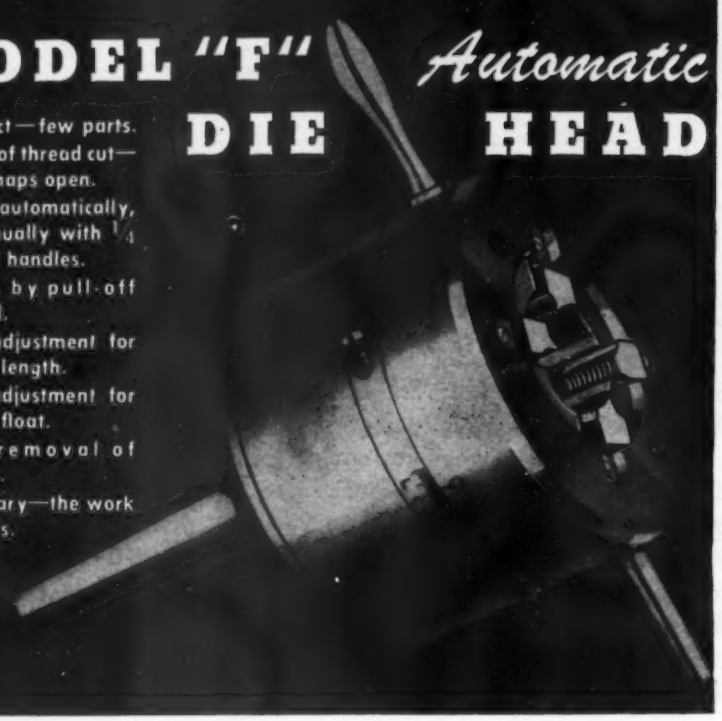
City_____ State_____

Rickert Shafer

FOR 35 YEARS

MODEL "F" Automatic DIE HEAD

1. Compact—few parts.
2. At end of thread cut—head snaps open.
3. Reset automatically, or manually with ¼ turn of handles.
4. Opens by pull-off method.
5. Easy adjustment for thread length.
6. Easy adjustment for lateral float.
7. Easy removal of chasers.
8. Stationary—the work revolves.



R-S, for over 35 years has stood for Rickert-Shafer, and precision threading equipment. Over the years we have concentrated most of our attention on second operation tools, Die Heads of all kinds, Collapsible Taps and Boring Heads. We have found time to design and build thousands of Friction-type Tapping Machines and hundreds of special designed-for-the-job Threading Machines. What is your production threading problem? Write today.

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DIE HEADS • COLLAPSIBLE TAPS • BORING HEADS
TAPPING MACHINES • SPECIAL THREADING MACHINES

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No. 1 to 60
New High Speed
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21 to 30	5⅜	.75
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41 to 50	4½	.75
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If you buy 60 drills or more — 20% discount

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MACHINERY EXCHANGE
INC.
251 CENTER STREET
NEW YORK N. Y.

HOW TO SOLVE

Lubrication Problems

WITH "CORRECT LUBRICATION"

Cut Down on "Play"— Get Greater Production!

A LITTLE "PLAY" goes a long way on automatic screw machines like this. Back lash and spindle "jumping," caused by wear to gear teeth and spindle bearings, can seriously affect the finished work.

The answer is Correct Lubrication—in this instance, Gargoyle Vactra Heavy Medium.

You get strong persistent films with this special oil, designed for the job. Wear and vibration are reduced to an absolute minimum. Accurate finish and continuous production are assured.

Be sure you obtain Correct Lubrication on all of your precision machines—through your Socony-Vacuum representative. You'll find that the *right* oil in the *right* place in the *right* way will pay you big dividends in *more* and *better* work.

GARGOYLE

Lubricants

CALL IN SOCONY-VACUUM FOR "CORRECT LUBRICATION!"

TURN PAGE

HOW TO SOLVE

Cutting Oil Problems

Get a Heavy-Duty Soluble Oil for Big Bites Here!

WHEN your milling machine takes a big bite on a roughing job (like the one shown above), the pressure on the teeth of the cutters soars to fantastic figures—350,000 to 400,000 pounds per square inch. Heat tends to mount with the severe rubbing of the chips on the cutters.

You need a special heavy-duty soluble oil that will minimize friction, carry away maximum heat and prolong cutter life.

S/V Solvac Oil 410 meets these exacting requirements for rough milling jobs. This heavy-duty soluble oil gives you maximum cooling and maximum lubricity.

Wear is reduced. Tools require fewer grindings . . . last longer. You save maintenance time and expense and get *more* work . . . *faster.*

GARGOYLE Lubricants

SOCONY-VACUUM

OIL COMPANY, INCORPORATED

HOW TO SOLVE

Quenching Oil Problems

Check Your Current Needs

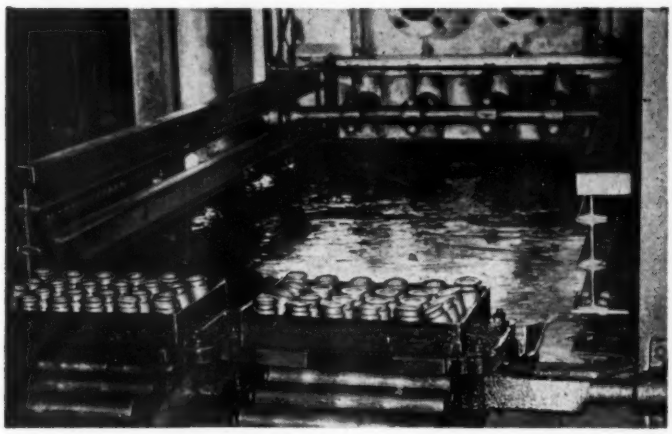
AGAINST THIS COMPLETE S/V QUENCHOL LINE...

NO MATTER what you need in quenching oils—whether it is routine or highly specialized—you'll find the exact answer in the complete S/V Quenchol line, illustrated here.

Over the years, this line has been carefully developed to cover every known quenching requirement of modern industry. One of these oils is designed to meet general quenching needs, where no critical problems are involved. The others are compounded to solve specific quenching problems.

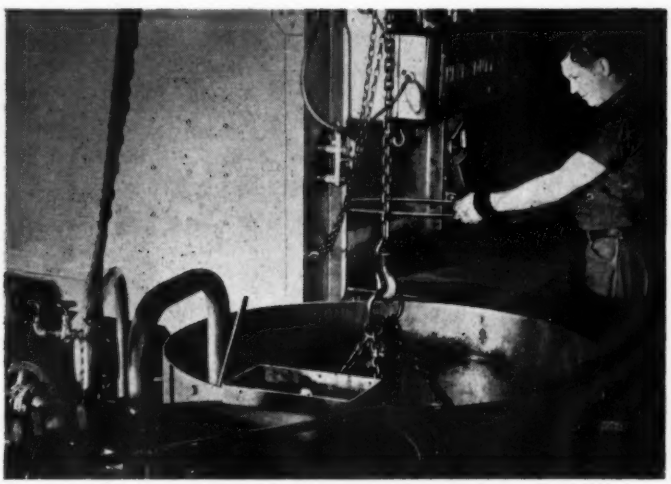
Read the captions under the pictures. Find the oil or oils that meet your individual needs. Then, call your local Socony-Vacuum representative for performance facts and figures.

☑ **S/V QUENCHOL A** is a stable quenching oil, for use where rapid quenching is desired.



☑ **S/V QUENCHOL M** is a conventional quenching oil, for use where moderate quenching speeds are required, no critical quenching problems involved.

☑ **S/V QUENCHOL R** is designed for exceedingly fast quenching. It is by far the fastest coolant in the line, provides deep, uniform hardness.



☑ **S/V QUENCHOL D** is a highly stable quenching oil, with maximum resistance to oxidation and sludging. It is moderately fast.

BACKED BY 78 YEARS' EXPERIENCE IN MAKING PETROLEUM PRODUCTS

GARGOYLE

Lubricants

No Guesswork in Our Recommendations!

Correct Lubrication is assured by Socony-Vacuum engineers working closely with machine designers and builders,

SAYS W. H. SHEPARD

Industrial Sales Manager,
Lakes Division, Socony-Vacuum Oil Co., Inc.

YOU may be interested to know how Socony-Vacuum makes the right oil or grease available for every machine you operate, even the most recent designs and types of all kinds.

Here's how we work in many cases: Shortly after a new machine is conceived by a designer, a Socony-Vacuum engineer is consulted on the lubrication problems involved and their solution.

Sometimes, it is found advisable to alter design details to assure Correct Lubrication. On occasions, it is necessary to develop an entirely new lubricant. More often, however, it is possible to select the exact lubricant needed for a specific machine from the famous Gargoyle line.

After this cooperative development work is completed, your Socony-Vacuum representative is advised of the existence of the new machine, the details that influence lubrication and the correct Gargoyle lubricants to meet all service requirements.

Thus, all guesswork is taken out of Socony-Vacuum recommendations. Your local Socony-Vacuum representative is backed by the world's greatest lubrication experience. Be sure to take advantage of it.

W. H. Shepard

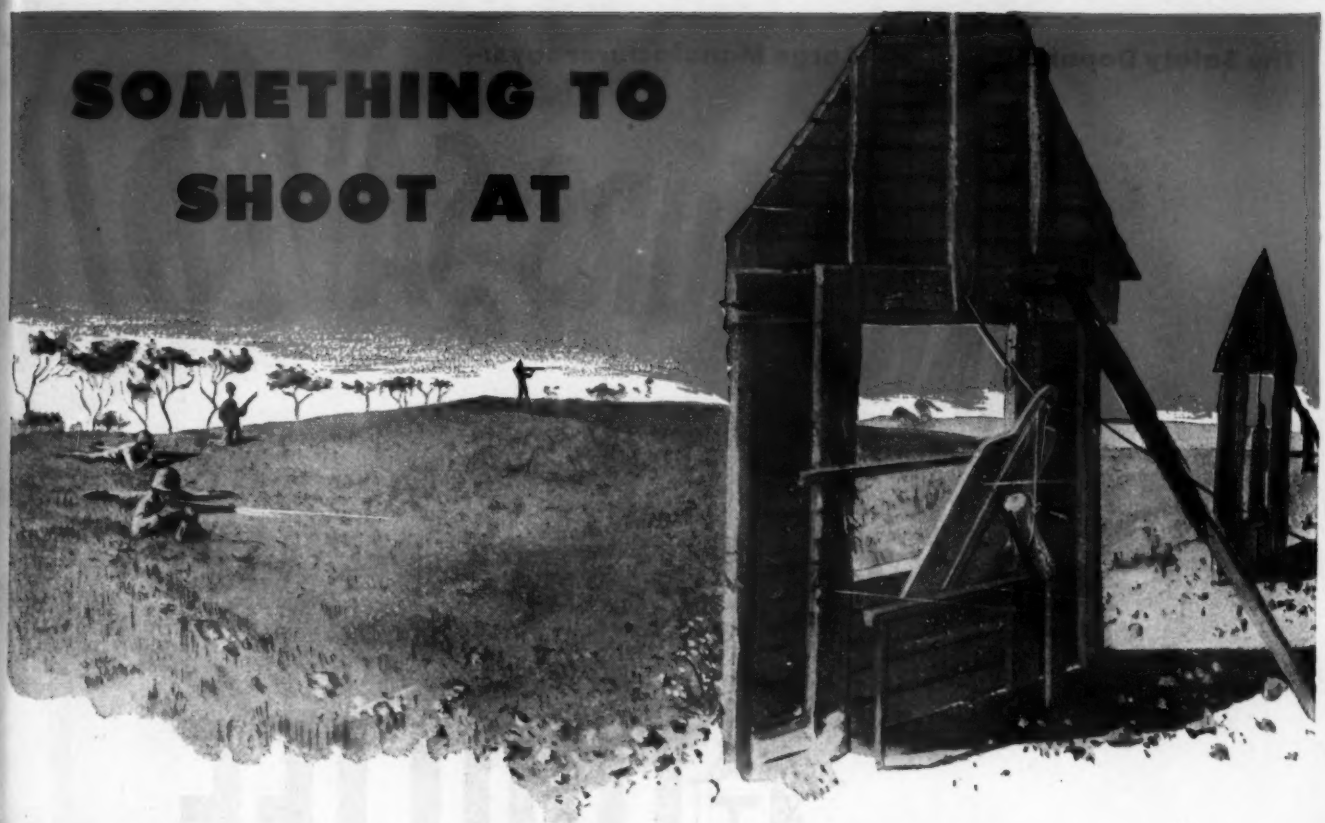
This is one of a series of messages to American Industry from Industrial Sales Managers of Socony-Vacuum Oil Co., Inc.

GARGOYLE
Lubricants

SOCONY-VACUUM OIL CO., INC.

Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. • White Eagle Div. • Wadhams Div. • Magnolia Petroleum Co. • General Petroleum Corporation of California

SOMETHING TO SHOOT AT

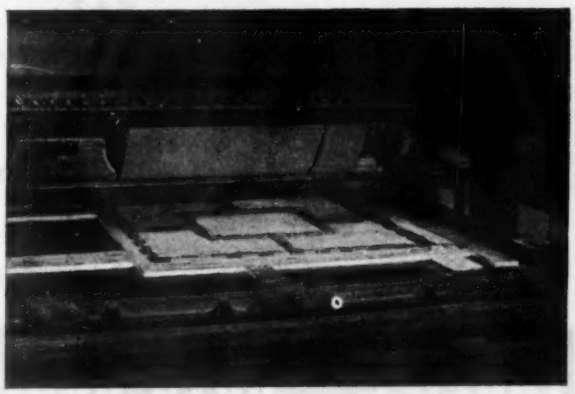


Many of the targets used in teaching service men how to shoot are cardboard cut-outs, which are die-cut on cylinder presses. The die is made of steel rule which cuts against a hardened, tempered and ground steel sheet known as cylinder jacket or tympan. These steel jackets are made in various sizes up to 56" x 80" in thicknesses from .062 to .135 of an inch. And the sheets must be curved to fit the cylinder without producing high or low spots on the jacket.

To make cylinder jackets that meet these strict requirements demands a rare knowledge of steel, a high degree of skill and experience and some pretty smart engineering. To the best of our knowledge, no one except Disston makes these hardened, tempered and ground cylinder jackets.

Chances are you have no use for cylinder jackets. But here's the point: you can use the Disston skill with steel and the Disston engineering experience, which make it possible for Disston to do the most difficult jobs. These assets are yours in our standard tools . . . in Disston circular and band saws . . . in our files and hack saw blades . . . in dozens of industrial tools for cutting wood, metals and other materials.

How may we help YOU? Write to Henry Disston & Sons, Inc., 1020 Tacony, Philadelphia 35, Pa., U. S. A.



Above illustration shows how Disston steel cylinder jacket, or tympan, is used on cylinder type of printing press. The die, made of Disston steel rule, is locked in position on bed of press. Cardboard to be cut is fed into press just as in printing. As the cylinder revolves, cardboard is die-cut when it passes over the cutting die—the steel rule being forced into and through the cardboard against the steel jacket.

DISSTON

Conserve Man-Minutes and help win the war

The Safety Department of one Large Manufacturer says:—

5973 MAN HOURS SAVED!

by

ELIMINATING OIL DERMATITIS

with

TOOLIFE
CUTTING BASE

because

It's Actually Germicidal

Write for descriptive booklet giving details on how thousands of plants are increasing their production.

TOOLIFE — CUTS COOLER . . . TOOLS LAST LONGER

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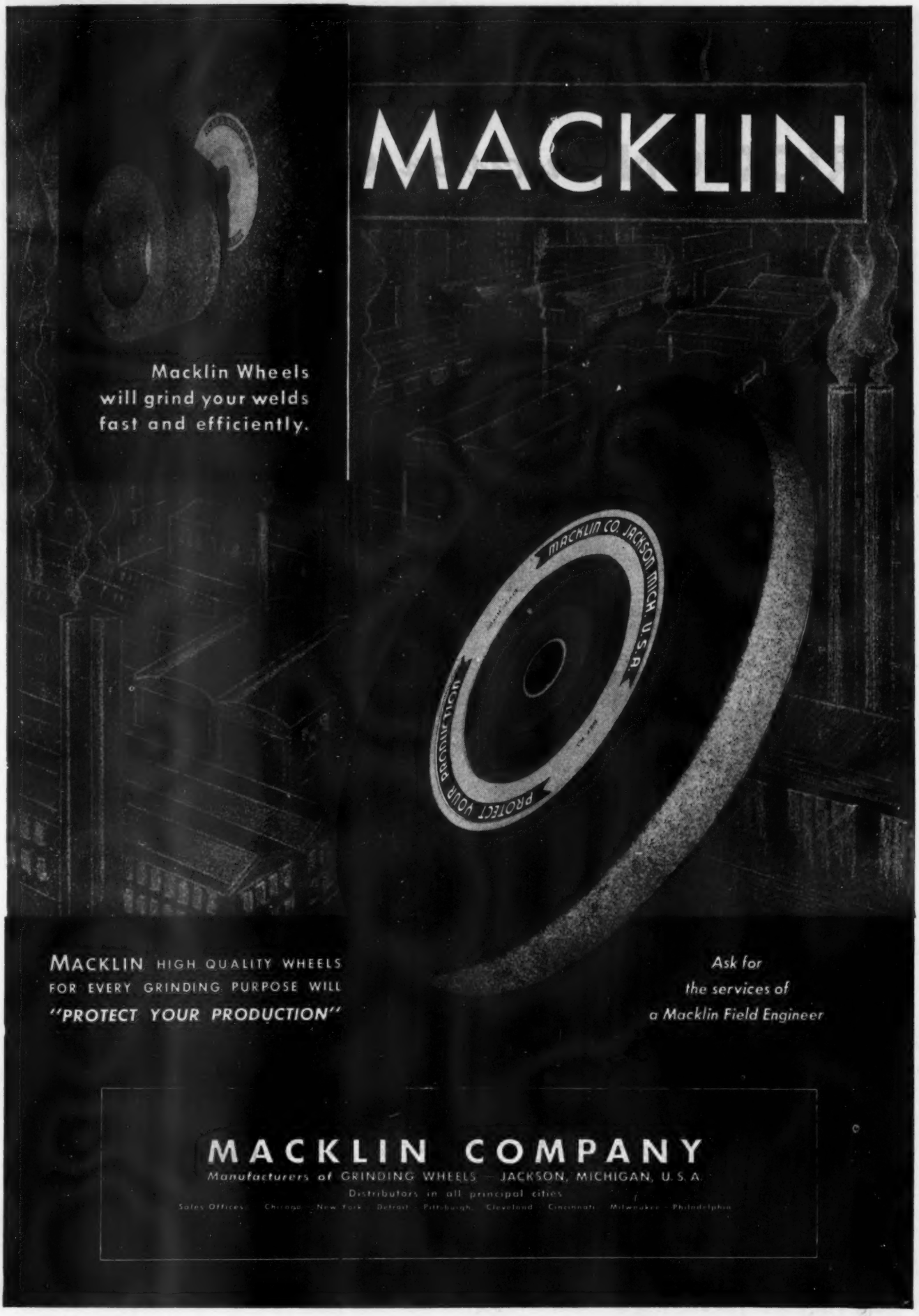
Manufacturers of SULPHUR, LARD and SOLUBLE CUTTING OILS and BASES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—a modern development for transmitting precision and accuracy from the machine to the job

ERICKSON *Precision* COLLET CHUCKS

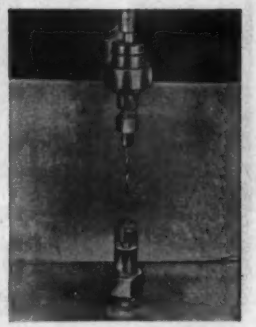
Model "01" accurate within .0005 or less at the nose.

Model "02" accurate within .001 or less at the nose.

Throughout manufacturing plants of industry the name of Erickson and the development of the modern collet and collet chuck have become synonymous.
Developed by collet experts, the Erickson Precision Collet Chuck is outstanding for its super gripping strength and ability to maintain accuracy.
Erickson Engineers regularly solve problems for many types of manufacturers anxious to improve results and profit by savings through proper handling of work.
Uses and applications of the chuck to fit your requirements will gladly be recommended upon request.

COLLET
OPEN
SLOTTED
BOTH ENDS
Collapses 1/32"
Maintains gripping strength and accuracy

U. S. Patent No. 2,228,685 Other patents pending.



Model 301 Chuck adapted to quick change production operation on upper spindle. Note self-contained, interchangeable drill bushings in special nose piece on lower chuck.

One Erickson Collet Replaces, at least, 7 Single Purpose Collets

Model 201 used in drill press. Extra long drills can be used, by extending them from the chuck as they wear.

Model 301 Chuck designed for high speed internal grinding operations.

Model 201 High Speed Router Chuck with extended nose piece for pattern following.

Horizontal Miller with 102 Chuck used to hold Woodruff Key Cutter.

Main and auxiliary turrets equipped with Erickson Chucks. Note short drill overhang, taps and reamers.

Vertical Milling operation with 101 Chuck.

Model 102 Chuck—adapted for standard floating holder operations.

Tool Post Grinder equipped with Model 301 Chuck.

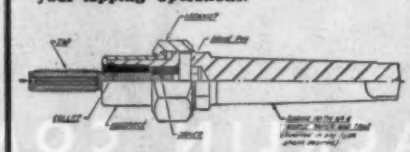
SEND FOR COPY OF BULLETIN "E"

The **ERICKSON EXPANDING MANDREL**

Uses an inverted adaptation of The Erickson Collet. Inquiries solicited for your requirements.

The **ERICKSON TAPPING CHUCK**

An outstanding new development. Send for information covering this chuck for your tapping operations.



Models 102 and 402 Chucks in use on Automatic Screw Machine.

ERICKSON CHUCKS ARE STANDARD EQUIPMENT ON MANY MODERN MACHINES

Leading manufacturers of newer equipment have been quick to recognize in the Erickson Chuck, a gripping means that adds to the accuracy and precision of their products. Inquire about Erickson Chucks for standard equipment.

ERICKSON STEEL COMPANY Dept. E • 2309 Hamilton Ave., CLEVELAND 14, OHIO, U. S. A.

POSITIVE TOOL BIT RIGIDITY

with the New Clark ADJUSTABLE TOOL HOLDER

Higher Machine Speeds, Faster Feeds, and Deeper Cuts!

Vise-grip jaw exerts pressure over full length of cutter channel... not just at one point... to hold four or more sizes of round or square tool bits... without sagging or breaking... *at higher speeds, with heavier feeds.*

With equal rigidity, the screw-operated jaw clamps large, heavy bits or short stub bits... under size or out of round bits... dual narrow tool bits for cutting-off or special forming operations... carbide bits and boring bars and bits of brittle alloys. With this new Clark Tool Holder, the operator has an unobstructed view of the cutting edge, for better work control.

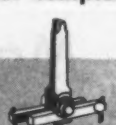
Write for complete catalog

SPECIFICATIONS

LEFT OR RIGHT HAND MODELS

With 15° Cutter Channel		With Parallel Cutter Channel	
Model 60 (Size 0)	Takes 1/8 to 5/16 tool	Model P60 (Size 0)	Takes 1/8 to 5/16 tool
Model 61 (Size 1)	Takes 3/16 to 3/8 tool	Model P61 (Size 1)	Takes 3/16 to 3/8 tool
Model 62 (Size 2)	Takes 1/4 to 1/2 tool	Model P62 (Size 2)	Takes 1/4 to 1/2 tool
Model 64 (Size 4)	Takes 5/16 to 5/8 tool	Model P64 (Size 4)	Takes 5/16 to 5/8 tool

Adjustable Hole Cutter



Adjustable Fly Cutter

CLARK CUTTERS

Robert H. Clark Company

Industrial District, BEVERLY HILLS, CALIF.

Adjustable Counterbore

Adjustable Facing Mill

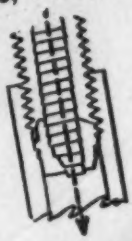
ADJUSTABLE CUTTING TOOLS FOR ALL MATERIALS

TAPPING TIPS

From Woody Spencer's Notebook

ANOTHER AXIS WE'VE GOT TO STRAIGHTEN OUT

"An axis," says Webster, "is a straight line, real or imaginary passing through any body, on which that body revolves." Of course, there's one big Axis we all know about. And you know the kind of a job we've done on that! But the axis that runs down through our taps and holes is something else. Not getting it licked is the cause of a lot of tapping troubles such as over size, bell-mouth holes and the like. But when we *indicate* that axis, true it up and keep it true, we get straight, sure holes and precision threads. Just like licking the Berlin-Tokyo Axis, it takes a little time but the results are well worth it.



These "Tapping Tips" of Woody Spencer, are by no means intended as technical advice. Their purpose is to pass along short-cuts, shop ideas and time savers we hope will smooth out some of the routine jobs.

For the real tapping problems that come up with almost every job, be sure to get definite technical suggestions. Send us complete details (material, diameter, lubricant, depth, etc. etc.). Our engineers will gladly send you specific recommendations.

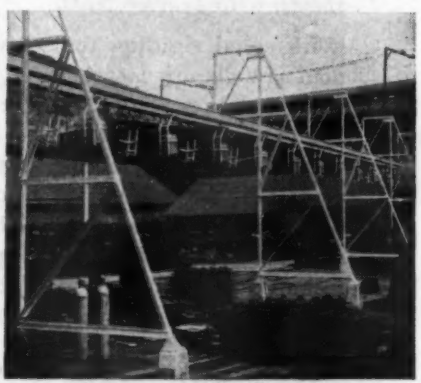
** Note: Woody Spencer's Tapping Tips will appear here as regularly as "Woody" gets time to write them up. Watch for them.*

THE RIGHT TAP AT THE RIGHT TIME

The Wood & Spencer Company
Cleveland 3, Ohio

Solving Tomorrow's Handling Problems *Today*

From the start of this national emergency, Mathews Engineers have burned the midnight oil. Huge layouts, new handling problems, very special devices — and every system vitally needed as quickly as possible. Brass and aluminum, ship and tank plate, aircraft parts and motors, shells and bombs — all had to be handled in quantities up to that moment unheard of. Many normal years of experience have been gleaned from these few months of activity. The ingenious developments in conveying these special materials will serve industry well in the peacetime years ahead, for the more highly developed the manufacturing and materials-handling phases of production become, the greater the number of people who can enjoy the advantages the product affords. It can be profitable to take advantage of the experience of Mathews Engineers. Their service is available in all principal cities in the United States and Canada.



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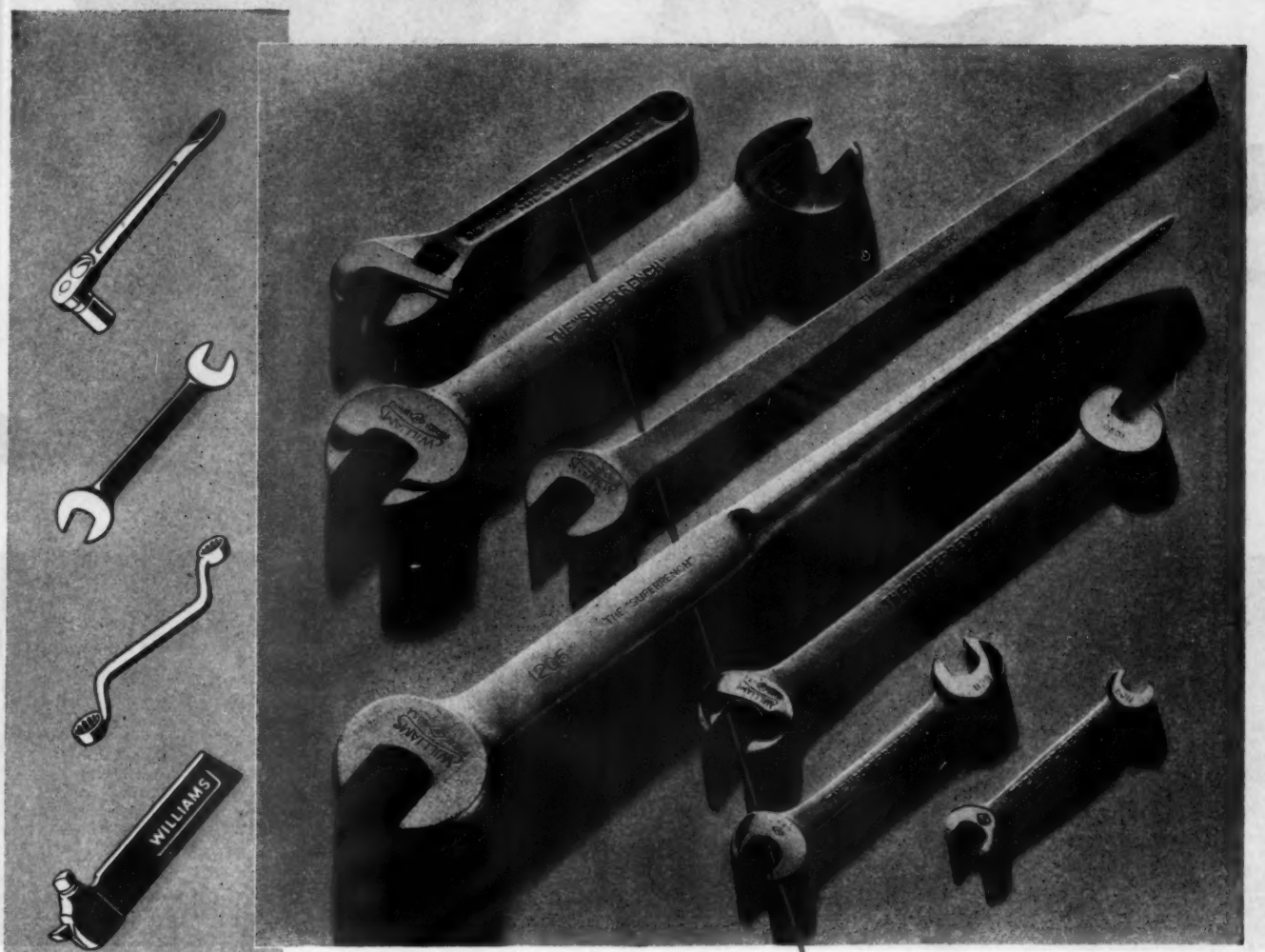

That industry may compete

The same tools that help win wars will lend new skill to the creative hand of postwar industry. Tomorrow these tools will produce those wanted things which a strife-weary world has long gone without . . . and produce them at less cost that more may enjoy them.

J. H. WILLIAMS & CO.,
Buffalo 7, N. Y.

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DROP-FORGINGS AND DROP-FORGED TOOLS

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By driving studs the "MODERN" power way, slow, laborious and costly hand methods are eliminated, and great savings in time, labor and money are assured.

MODERN STUD SETTERS in the Packard Plant contribute to the overall production efficiency in turning out Rolls Royce Engines. Packard is using the same method in setting studs in aircraft engines as the automobile manufacturers have used for many years.

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Write for detailed information on the MODERN Stud Setter. You'll be interested in how and why it provides a proved means of stepping up production.

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ROCHESTER 10, NEW YORK

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It contains details of FCC Tool Steels Cast To Shape and of other important Forging and Casting Division specialties that may offer you money-saving production ideas. Get your copy—write for it today.

Address Dept. AM-31

WHEN it's dies you're making—small or large—or various other forming tools or gages or certain fast-wearing parts of machines, FCC Tool Steel Cast To Shape can really save you money.

Very intricate shapes can now be cast in one piece within an eighth-inch of finished size. This means that you pay for less steel to begin with, and reduce machining time substantially.

Air Hardening, Oil Hardening and special Hot Work Tool Steels of various grades—each a thoroughly dependable performer in its class—are available in this modern, economical form.

Prompt delivery under CMP.

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A Los Angeles manufacturer decided to find out how much cutting oil his plant was using. He got a real surprise. Five drums were being used every week, or 260 drums a year. At $18.72 a drum, he was paying out $4867.20 a year for cutting oil.

Then, an American Chip Wringer was installed. Instead of the 5 drums of cutting oil formerly used, only 2 were needed. That meant a saving of $2920.32 a year, which paid for the Chip Wringer in less than 6 months. From then on, the savings were added profit.

We'll gladly help you figure just how much money and valuable oil an American Chip Wringer will save you. No obligation. Just write.

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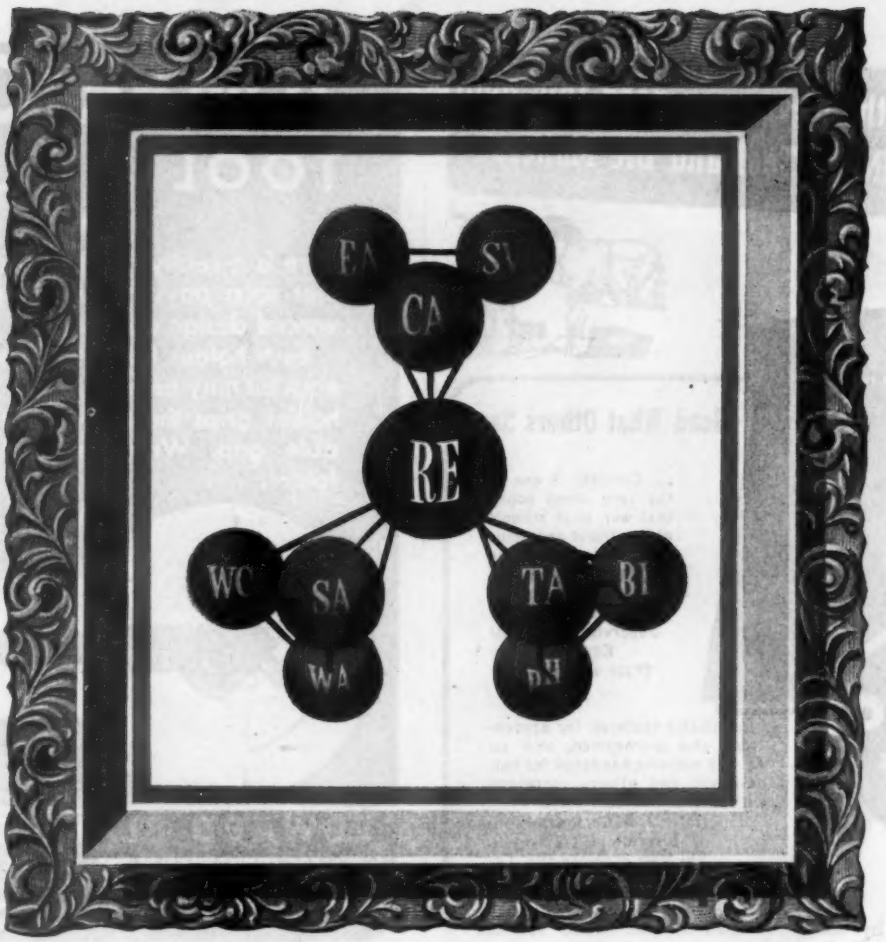
Representing the AIRLINES of the United States



PORTRAIT OF STEEL BEING PICKLED

Whether you are cleaning steel for electroplating, protecting metals against rust and corrosion, or preparing aluminum for spot-welding, this is the picture of working factors in the scientifically balanced chemical compound. It is a cement floor being cleaned. It is a diesel engine or coils being descaled. *It is Turco in action.*

The relative value and balance of all the factors is determined by RE; for Research and Experience are the directing agents. They assign roles, give to each agent the correct emphasis, balance them all (one factor does not insure effectiveness in a compound any more than one drug in a prescription). RE symbolizes two decades Turco laboratories have devoted to solving industry's vital problems in the conditioning, maintaining and cleaning of surfaces. Take advantage of it on everything from washing a locomotive to preparing aluminum for anodizing. Call the Turco Field Service Man, or write to Turco. A.M. 10

* *For a fuller explanation of these vital factors, write for Turco's "The Chemistry of Chemical Compounds," on your letterhead, please.*

- *—Emulsifying Action disperses grease and oil as tiny globules, suspends them, and prevents redeposition.*
- *—Colloidal Activity disperses solids into minute particles easily removed.*
- *—Saponifying Value is the ability to convert organic fats and oils into soluble soaps.*
- *—Total Alkalinity (or acidity) is the total amount of either available for cleaning.*
- *—Buffer Index is the ability to absorb either alkaline or acid soil to prolong solution efficiency.*
- *—A yardstick for measuring the energy of alkalinity or acidity.*
- *—Solvent Action is the ability to put soil into solution.*
- *—Wetting Action lowers surface and interfacial tensions, causing solution penetration to base surface.*
- *—Water Conditioning removes or controls the elements which cause water hardness.*
- —all the elements above are mobilized through Turco's Research and Experience.*

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Supervisor Industrial Education
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... Valuable textbook for apprentices and journeymen, and an equally valuable handbook for tool designers and others concerned with the use of tool steel.
J. B. Chalmers
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Widely used by many companies and trade schools throughout the U. S., it meets urgent need for a complete, up-to-date text for training new men, "refreshing" older men, or trouble-shooting in the tool room. The shortage of tool and die makers must be met fast by men who know the "whys" and "hows." This book gives them both and more. It shows how to select tool steel; how to make tools; how to avoid trouble; how to improve tool performance.

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By FRANK R. PALMER
Vice-President of
The Carpenter Steel Company
315 pages — 205 illustrations
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Please send me postpaid your convenient handbook, "Tool Steel Simplified". I enclose $1.00 ($3.50 outside the U. S. A.) in full payment.

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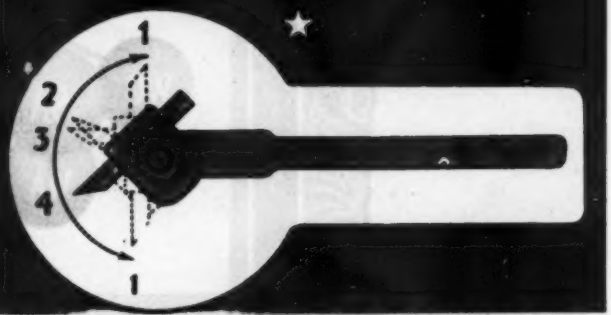
Each holder holds three sizes of bits—each bit may be held in four positions—the holder grips the tool with a wide, immovable grip. Write today for descriptive folder.



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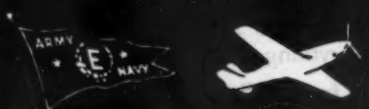
You can Depend on Micrometer Graduations for Controlling Hole Size

For finishing cuts with extreme accuracy. Extremely rigid. Easily and quickly adjusted like a micrometer to within .0005. All standard type shanks available Singly or in sets. Write for catalog.



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UNIVERSAL ENGINEERING CO.
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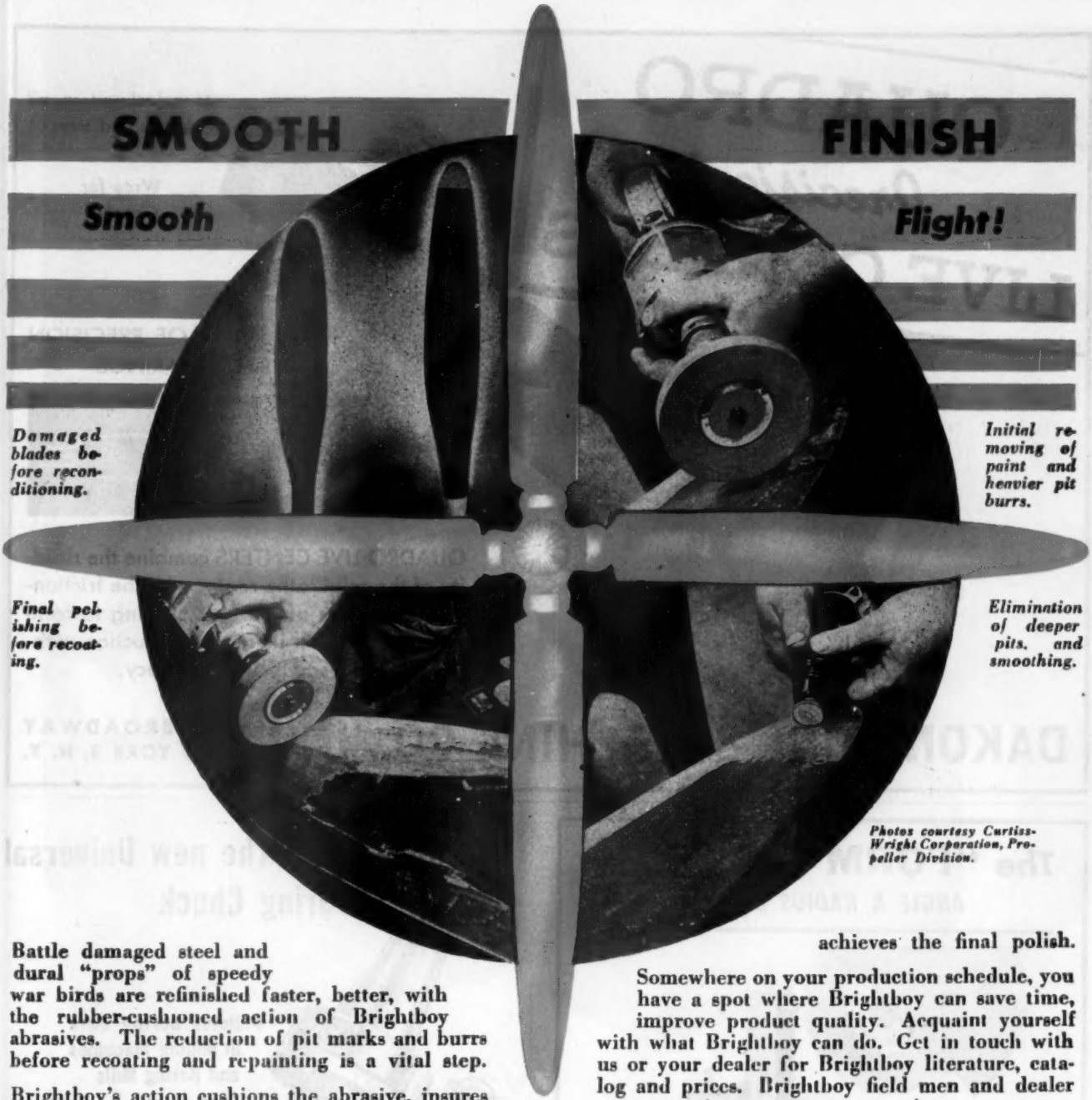
Smooth Flight!



Damaged blades before reconditioning.

Initial removing of paint and heavier pit burrs.

Final polishing before recoating.

Elimination of deeper pits, and smoothing.

Photos courtesy Curtiss-Wright Corporation, Propeller Division.

Battle damaged steel and dural "props" of speedy war birds are refinished faster, better, with the rubber-cushioned action of Brightboy abrasives. The reduction of pit marks and burrs before recoating and repainting is a vital step.

Brightboy's action cushions the abrasive, insures controlled precision finishing. In one operation, Brightboy eliminates the production steps between the grind and the buff and frequently achieves the final polish.

Somewhere on your production schedule, you have a spot where Brightboy can save time, improve product quality. Acquaint yourself with what Brightboy can do. Get in touch with us or your dealer for Brightboy literature, catalog and prices. Brightboy field men and dealer representatives are at your service.

BRIGHTBOY INDUSTRIAL DIV.
WELDON ROBERTS RUBBER CO.
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QUADRO *Precision* LIVE CENTERS

Manufactured in all tapers and sizes.

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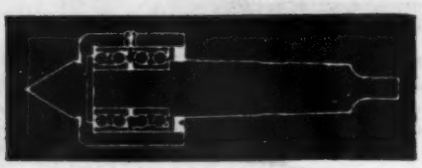
Write for Circular.

FOUR ROWS OF PRECISION BALL BEARINGS

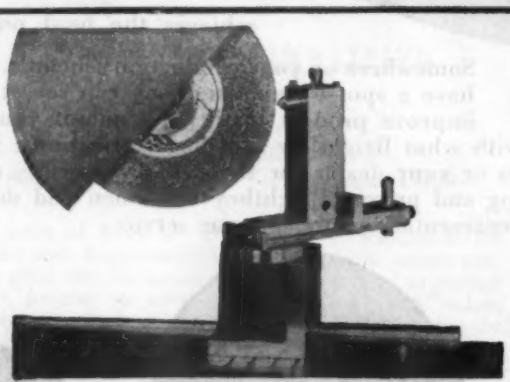


QUADRO LIVE CENTERS combine the rigidity of the solid lathe center with the frictionless properties of the ball bearing to form a tool which will increase production without sacrificing accuracy.

DAKON TOOL & MACHINE CO., INC. 838 BROADWAY NEW YORK 3, N. Y.

The "FORM-MASTER"

ANGLE & RADIUS DRESSER



An all-purpose angle and radius dresser for high-precision at low cost. Accurate easily within .001". Simple to operate. Dresses in vertical position enabling operator to SEE the form in work. All parts hardened and ground (except cast-iron base which can be drilled and tapped). Suitable for surface and cylindrical grinders. Two 1/3 ct. diamonds and instrument case included. $150.00.

It readily produces: Any desired angle
Convex radii to 4" on 7" wheel
Concave radii to 7" on 7" wheel

Specifications: Base 3" x 3", height 8½"
Wheel capacity 10"
Angular travel 3"

For information or a demonstration CALL YOUR SUPPLIER

Manufactured by

J. & S. TOOL CO.

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"PRECISION DRESSING TOOLS"

ANNOUNCING! The new Universal Boring Chuck

← Holds Boring Bars in Milling Machines and Boring Mills

Holds boring bars rigidly. Offset adjusting screw allows bar to be advanced or receded to suit work. Anti-backlash arrangement insures extreme accuracy. Two sizes, for bars ⅜" to 1" with milling machine taper or Morse taper shanks. Write for catalog.

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From ½" to 3" round bars

IT'S FAST! IT'S EASY! IT'S ACCURATE! . . .

You simply insert one end in the Vee-block, tighten the hand wheel and advance the center drill—then reverse the bar and center the other end. Your Quick-center will do—in less than a minute—a job that may take over half an hour on a lathe . . . and do it far more easily and more accurately. The Murchey Quickcenter, small and compact, increases shop output, uses unskilled operators, saves time and material—and increases your profits.

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METAL CUTTING SAWS

NO WONDER THEY'RE GOOD

This company has been making circular metal cutting saws since 1923, when it was founded, and all its officers and employees were experienced saw makers for a long time before that. Almost all of our factory space, 20,000 square feet, is devoted to this one product.

So it is a fair assumption that we "know" circular saws. In fact we *have* to, because our reputation depends chiefly on this one product. No wonder circle "R" saws are good!

Have you tried them? If not, send for our Catalog K.

PRECISION CONTROL

of manufacturing is another reason why Circle "R" saws are good. Our modern heat treating ovens have potentiometric control, — the most accurate method for the purpose.

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Step up the speed of your marking operations with Noblewest precision built marking equipment. You will be certain of sharper, clearer, lasting impressions whatever the size — whatever the shape of the item to be marked. Find out how Noblewest marking machines can be adapted to meet your individual requirements. Write for our new catalog supplement No. 43 — "Your Guide To Better, Faster, Marking."

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NOBLEWEST IMPROVED MARKING DEVICES

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STRIPPING ZINC CHROMATE PRIMER FROM ALUMINUM

For stripping zinc chromate primer from rejected aluminum parts, try this highly effective, yet easy-to-execute Oakite method:

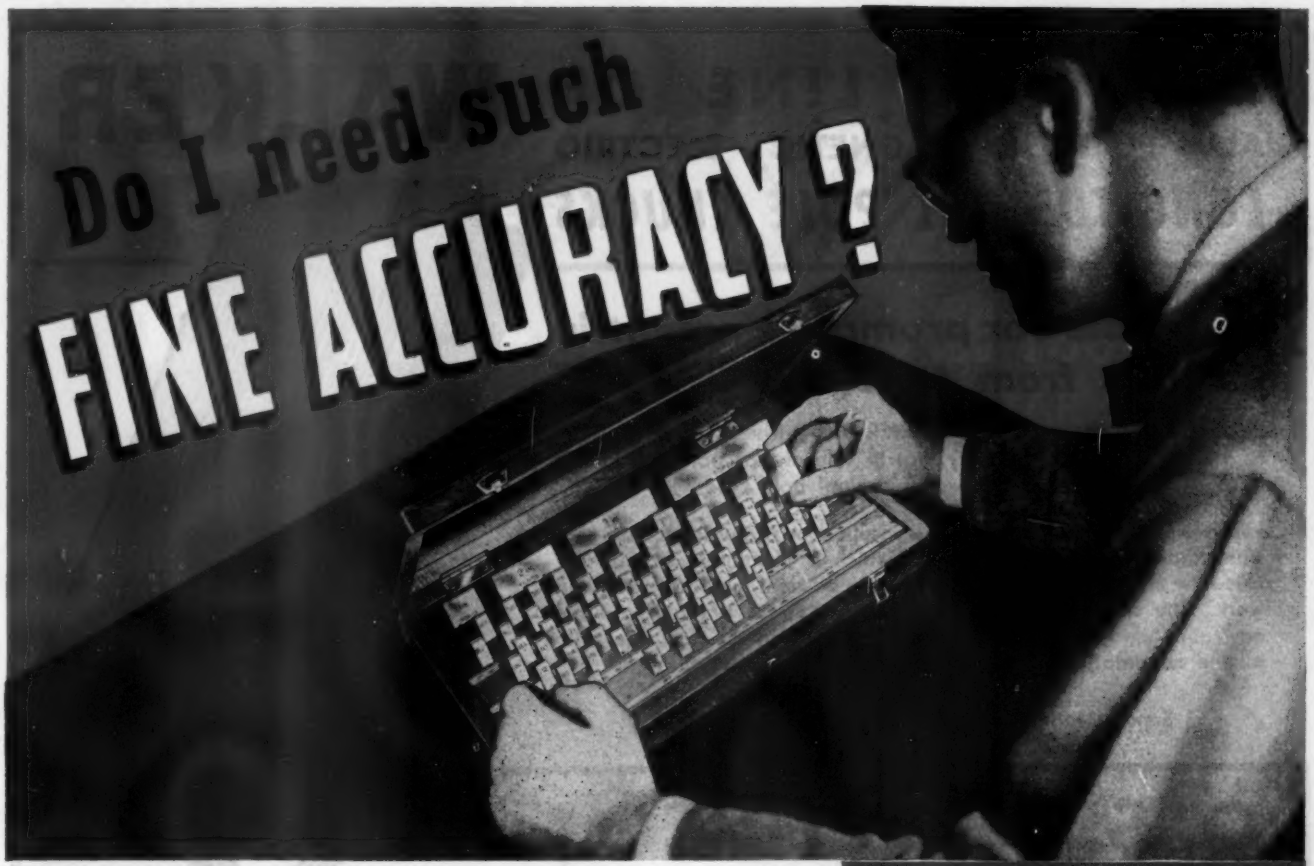
Immerse parts in a hot solution of Oakite Composition No. 64. Then rinse and the job is completed! Primer coat is thoroughly, speedily removed . . . aluminum surfaces left unharmed . . . ready for the next step.

Let our nearby Oakite Technical Service Representative help you in this work. No obligation, of course!

OAKITE PRODUCTS, INC., 24 Thames St., NEW YORK 6, N. Y.

Technical Service Representatives Conveniently Located in All Principal Cities of the United States and Canada

OAKITE CLEANING



The FONDA-developed special *Stabilizing* process enables FONDA gage blocks to pass the highest stability tests that the National Bureau of Standards has devised. FONDA gage blocks also possess the remarkable new *"Ultra-Finish"*...with gaging surfaces practically devoid of "peaks"!

All of which means that FONDA gage blocks establish higher standards of fine-precision accuracy—and *maintain* such accuracy, without appreciable loss, over long-extended periods of service.

The question sometimes is asked whether such extremely close accuracy is required by the average shop or laboratory.

Let us show you why it pays any shop working to the thousandth of an inch, or finer. Remember, too, no expensive premium is charged for FONDA *longer-lasting precision.*

Prompt Deliveries

FONDA GAGE COMPANY

Stamford, Connecticut

Agents in All Principal Cities throughout the World

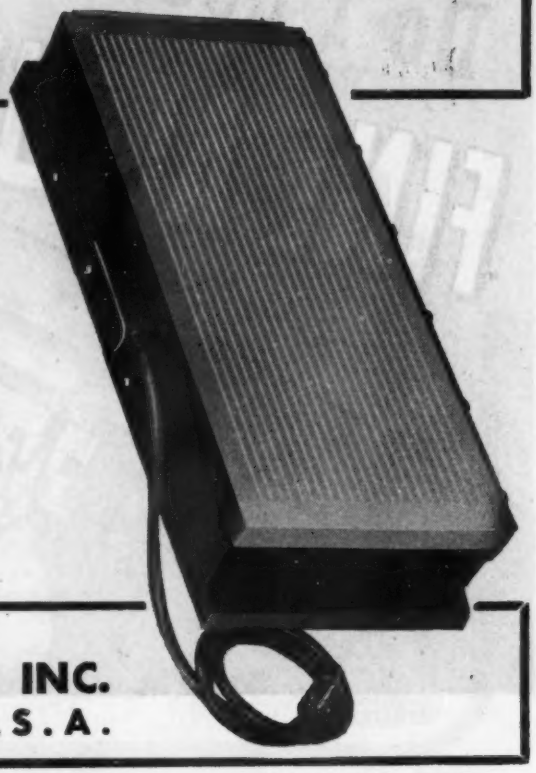
30

FONDA *Gage Blocks*

For information on the modern new techniques in gage block manufacturing, write for BULLETIN

PASSED HIGHEST TESTS DEVISED BY THE NATIONAL BUREAU OF STANDARDS

THE NEW LINE OF WALKER
ALL - PURPOSE MAGNETIC - ELECTRIC
LONGITUDINAL POLE CHUCKS



Available for prompt shipment in all sizes from 4"x10" to 12"x60"

In announcing these chucks, WALKER also wishes to call attention to the metal working industry that its line of bar pole chucks has been superseded by this new longitudinal pole type.

Improvements in the design have resulted in a sturdier chuck that withstands a lot more abuse and which is absolutely waterproof. This new chuck has also proved a more efficient method of holding work. The same fine pole divisions which were a feature of the now outmoded bar pole design are retained in the new line, with all the advantages which this construction has demonstrated.

Send at once for complete detailed information.

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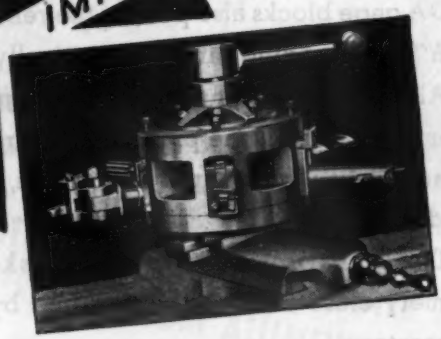
Our NEW IMPROVED



5 STATION LATHE TURRETS FOR THE POST-VICTORY YEARS

OUR NEW IMPROVED TURRET HEADS are a Vital war-time necessity in machine shops and plants today. Also Vital for your Post-War planning where COMPETITION will be so keen — tomorrow. For the Victory years ahead, order now, equip your machine shop or plant with OUR NEW IMPROVED TURRET HEADS.

5 TOOLS IN POSITION *for* **INSTANT CHANGE**

ALLOWING MINUTE ADJUSTMENTS WITH 10 ACCURATE TOOL POSITIONS

Write Today for Complete Details

Made up in Four Individual Sizes

AUTOMATIC MACHINE & TOOL CO. — ENGINEERED PRODUCTS — AUBURNDALE, MASSACHUSETTS

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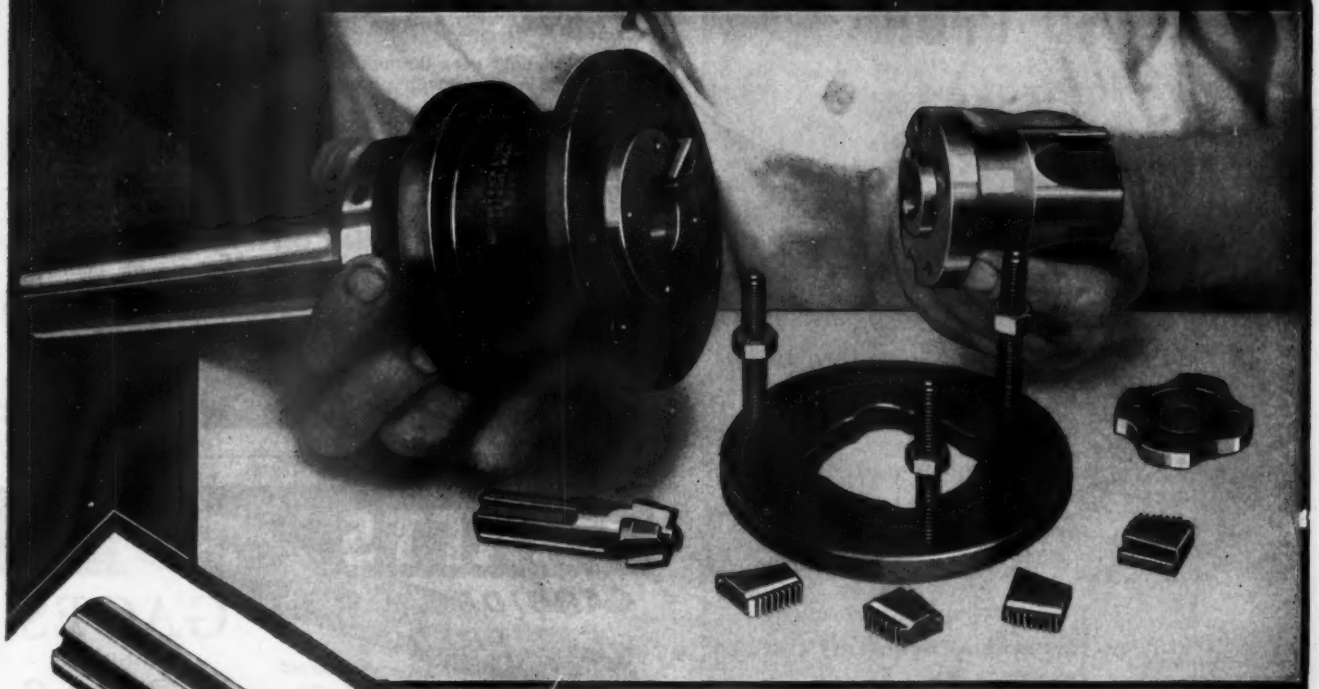
Announcing Murchey

THE NEWEST ACHIEVEMENT BY

15 Threading Sizes in Only 2 Tools

TYPE L COLLAPSIBLE MACHINE TAP



Showing Chaser Bearing on Pin

NEW MECHANICAL FEATURES

Separate nose pieces and two bodies provide threading ranges of 1⅛" to 6" in diameter. 15 sizes in all —8 for smaller—7 for larger. Simplified design. Single centralized spring. Fewer pieces. Chasers mechanically stronger. Bearing surface 100% on the pin.

ADVANTAGES OF TYPE L

Flexibility. Better alignment—straighter threads. Greater dependability—trouble-free performance . . . longer life. Can be used on machines with or without lead screws. Tripping mechanism may be operated from face of the work or by the use of a yoke. All exposed surfaces treated with penetrating rust-proofing process.

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DETROIT 26, MICHIGAN

Murchey also manufactures all types of Collapsible Taps, Self Opening Die Heads and Tapping Machines. Write for literature on any of these products.

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RIGID CONTROLLED SAWING

CAN BE DEPENDED UPON *with improved* MILFORD PROFILE SAW . . .

Thanks to MILFORD metallurgic and manufacturing improvements . . . back and side wear is counteracted . . . bowing and stretching eliminated. The saw is stiffer and cuts true to the line.

Complete stock of MILFORD PROFILE SAW is carried by all MILFORD distributors in every Industrial Center of the country. The MILFORD distributor in your locality is as near as your telephone . . . remember him when you want PROFILE SAW in a hurry.

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REZISTOR AND DUPLEX HACK SAW BLADES

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Saw Specialists Exclusively for Over 65 Years
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THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER *on Your Work*

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅛" to 12". It will keyseat in blind holes, taper holes, and offset holes. We also manufacture oil-grooving millers.

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CINCINNATI, OHIO

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Consistent Quality

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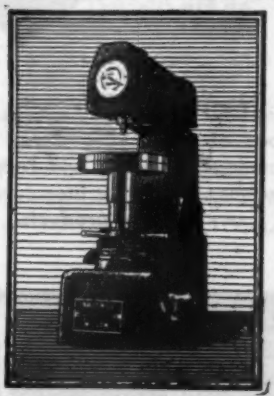
These new improved type testers available from stock.

Made by us for 23 years and still made by us only.



WILSON
MECHANICAL INSTRUMENT CO. INC.
Concord Ave., New York 54
An Associate Company of American Steels & Cable Company, Inc.

KINKS FROM GEOMETRIC

ON HOW TO SAVE PRECIOUS CHASERS

...AND GET BETTER THREADING!

don't waste high speed steel and burn precious chasers by using excessive speeds on threading jobs.

do run your chasers at conservative surface speeds and get better threading. Ask us for FREE chart showing proper speeds for principal materials.★

★ Speeds for Threading with High Speed Steel Chasers

The table below shows recommended surface speeds, in F.P.M., for some metals. A COMPLETE chart covering all principal metals and other materials, including a conversion table into R.P.M., will be sent on request. Printed on heavy cardboard, 8¼" x 11", it is a real help in getting the most and best out of your chasers! Write: THE GEOMETRIC TOOL COMPANY, New Haven 15, Connecticut.

MATERIAL	SURFACE SPEED (F.P.M.) FOR T.P.I.			
	3-7½	8-15	16-24	25 & Up
Chrome Ni-Chrome Nickel Stainless-Steels, etc.	8	10	15	20
Wrought Iron Steels— SAE No. 1040 SAE No. T1330	15	20	25	30
C. R. Steel Bess. Scr. Stock, etc.	20	30	40	50
Brass Forgings Naval Bronze	25	40	50	80
Brass Stamping Tubing	40	80	100	150
Aluminum Bar Brass Cast Brass	50	100	150	200

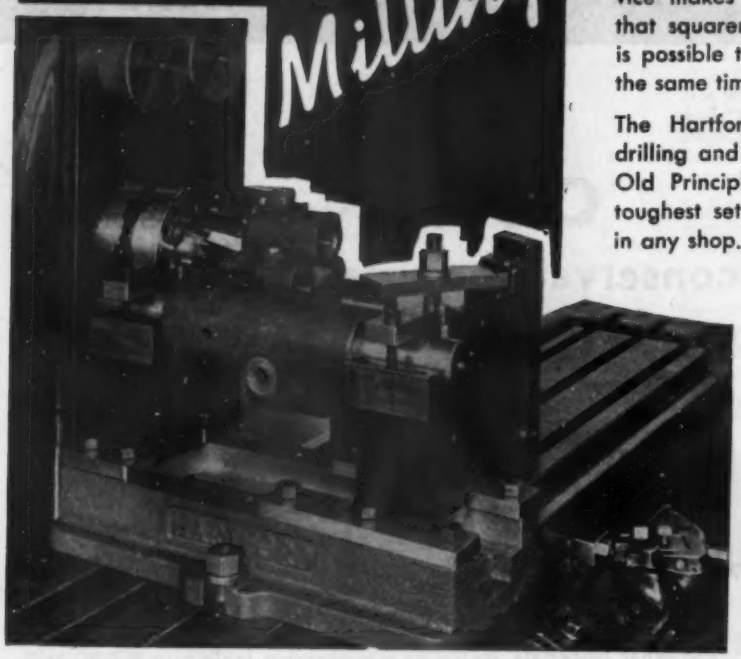
T.P.I. = threads per inch

The Geometric Tool Company is listed on the Treasury Department's Roll of Honor of those companies whose employees devote 10% of their earnings, through the Payroll Savings Plan, to War Bonds. Buy War Bonds and Stamps —help clinch the Victory!

GEOMETRIC

SELF-OPENING DIE HEADS
COLLAPSING TAPS
CHASER GRINDING MACHINES
SOLID ADJUSTABLE DIE HEADS
SOLID ADJUSTABLE TAPS
THREADING MACHINES

The HARTFORD V-BLOCK FIXTURE applied to Milling



—Saves Time—Assures Accuracy

Many jobs involving the holding of irregular shaped work can be greatly facilitated with this recent "HARTFORD" development. Applied to squaring up the end of a casting in the horizontal milling operation shown here, this new device makes possible taking the cut with utmost assurance that squareness to the holes will be correct. Furthermore it is possible to complete any other cuts or milling of pads at the same time.

The Hartford V-Block Fixture—applicable also to boring, drilling and inspection—is in reality a "New Adaption of an Old Principle." It can be depended on to speed up the toughest set up and thereby prove a worthwhile investment in any shop. It will pay you to investigate, NOW!

Simple in design and construction, the HARTFORD V-Block Fixture consists of a semi-steel base accurately machined and scraped. Provision for secure holding of base to machine table is effected by cross keyways and ample clamping facilities. A set of clamps for positioning V-blocks in the base provide for adjustment of V-blocks. A set of hardened and accurately ground V-blocks with a set of clamps for holding test bars or arbors in place is included as standard equipment with this device.

The HARTFORD SPECIAL MACHINERY CO.
Hartford Conn.

ERRINGTON MECHANICAL LABORATORY

STAPLETON, STATEN ISLAND 4, N. Y.

MULTIPLE HEADS

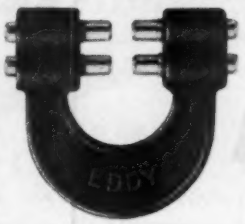
Super-Sensitive Fixed Center Multiple Drilling Heads

Fixed-Center Auto-Reverse Multiple Tapping Heads

All Parts Fully Enclosed to Insure Pressure Lubrication Rigid Support of and Adjustable Spindles

ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

EDDY ADJUSTABLE GAGE No. 77



A Convenient Gage for General Work—Easily Set and Sealed for Each Job—Can be Set to Micrometers Instead of Size Blocks—Will Gage in a Recess or Close to a Shoulder.

Rods Are Made in 2 Lengths

Gage fitted with 4 rods, adjustable from 0" to ½" $14.00
Gage fitted with 4 rods, adjustable from ½" to 1" 14.00
Gage in case, with 8 rods, adjustable from 0" to 1" 20.00

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GRINDING WHEEL DRESSERS

Desmond Cutter

Desmond Hex Dresser

We manufacture a complete line of Dressers and Cutters. Write for copy of catalog "A".

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CHATTERLESS COUNTERSINKS GIVE MIRROR FINISH..

If your production calls for perfectly finished seats, you simply can't beat Severance Chatterless Countersinks. In a few seconds, they produce a finish that will stand up to a commercial ground job. Using a standard type, a finish sufficiently smooth for valve seatings may be obtained. Because of their staggered tooth design, they take clean, shearing cuts — thereby eliminating chatter. Available with any angle and in a wide variety of diameters, lengths and shanks. Heavy duty types have tang shanks and may be used with a Glenzer sleeve. Write today for complete facts about how Severance Chatterless Countersinks can solve your countersinking problem.

Severance Midget Milling Cutters and special cutting tools of many types are available, with Severance tooth design, for finishing every kind of wood, plastic, metal and alloy. These fast-working tools take sharp bites, throw off clean chips. For best service, order new cutters and send your worn cutters for regrinding to the nearest Severance plant.

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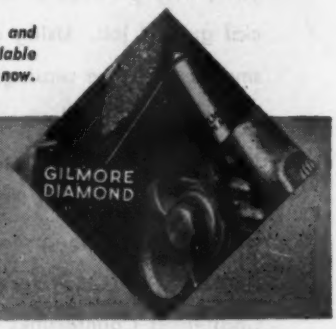
DIAMOND TOOLS

Meet today's exacting requirements for truing precision grinding wheels

Gilmore facilities include not only an adequate supply of rough diamonds but also a complete, fully equipped modern plant for tool making and diamond cutting. Careful selection of diamonds combined with long experience in mounting diamonds for highly specialized wheel truing use, enable Gilmore to render an invaluable complete service to the metal working industry.

Gilmore Diamond Tools include mountings for hand and machine wheel truing, needle point diamond tools for use on wheels used in grinding taps, threads, gages, small contours, etc. and tools for truing specially formed grinding wheels.

Complete information on the Gilmore line and service is contained in illustrated folder available promptly on request. Send for your copy now.



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Let the SCLEROSCOPE speed up the production of that s so we can blow the Axis to HELL

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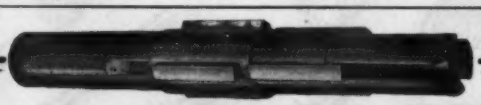

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CUT COSTS

Because they save time, promote precision. Set of 19 does the work of 193 solid arbors, for all bores from 1" to 7". Hardened tool steel. Singly or in sets. Prompt delivery. Recognized as standard the world around.

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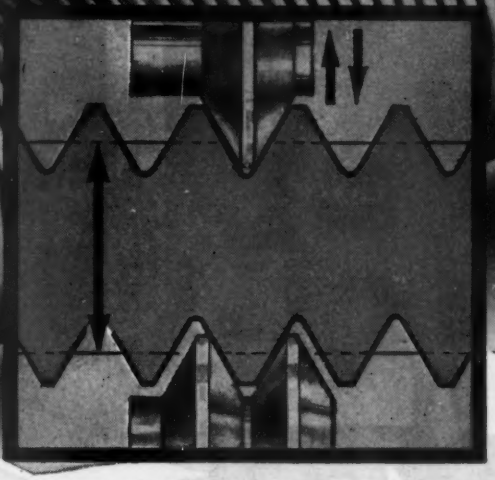
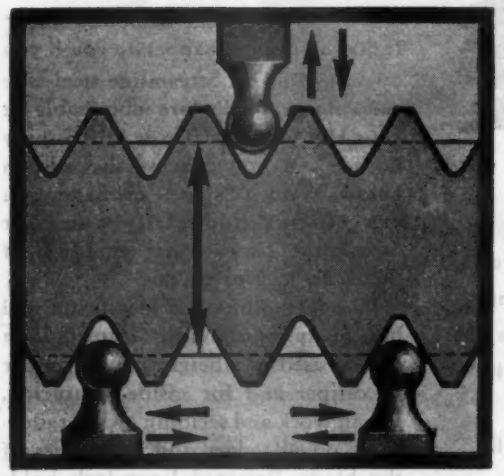
A Faster Way to Inspect PITCH DIAMETERS

Positively, More Accurately and to closer tolerances



MODEL 45B-100. The upper, sensitive roller contact actuates the Dial Indicator.



MODEL 45B-80. The upper, sensitive ball contact actuates the Dial Indicator. Both lower ball anvils float sidewise independently to compensate for any variation in lead.

No conventional type of gage, whether ring gage or roller-type snap gage, can tell you so **definitely** and so **quickly** the degree of accuracy of a pitch diameter as these two types of Dial Indicator Gages. Neither depend upon the uncertain sense of touch.

The roller type tells more than the conventional roller snap gage because the sensitive upper roller contact, reveals on the Indicator, just **how much** and **where** the pitch diameter may be wrong. The ball type simulates the three-wire method, but is faster. It is accurate to a tenth of a thousandth. Either type is incorporated in the adjustable Dial Indicator Gage shown below. For details write—

TWO FULL COLOR FILMS
(With Sound)
No. 1 DIAL INDICATORS
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20 minutes each. For instruction and training.
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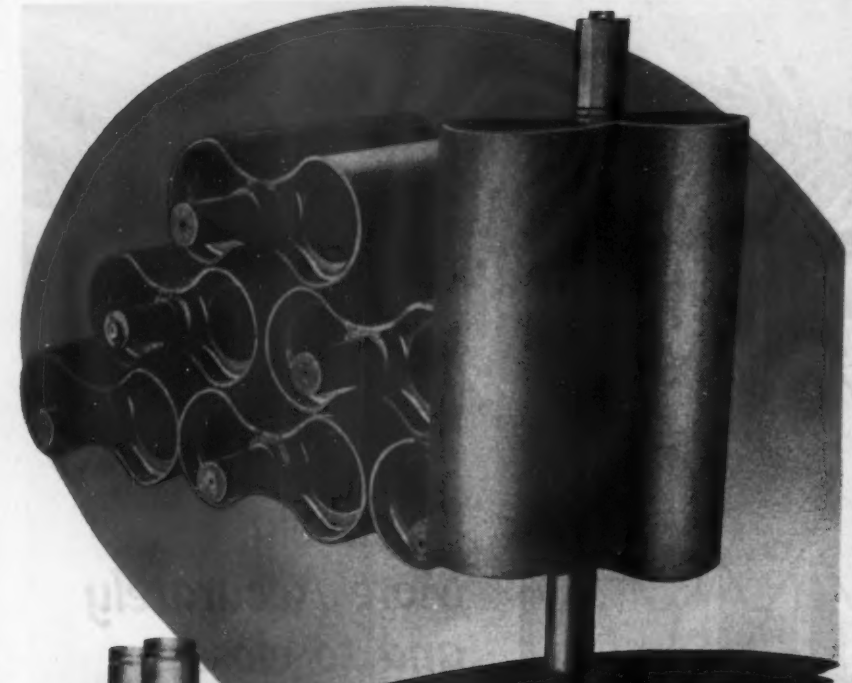

In Regular Production at UNITED WELDING

Blower impellers, like those above . . . field rings like those below . . . are today regular "grist for our mill". That is war production. Soon, let us hope, things of a more peaceful nature will take their place.

You, no doubt, have or soon will have, products to market. Those products may be of a design that would gain through welded construction . . . for style . . . for strength . . . for lightness . . . to make them less costly to produce. If so, our engineers and our facilities can serve you to advantage.

Let us look at your drawings. Confidential of course. Get our quotations.

ARMY E NAVY

WELDING ENGINEERS · UWCO · MIDDLETOWN, OHIO

THE UNITED WELDING CO.
MIDDLETOWN, OHIO

WELDING FABRICATORS OF MODERN DESIGNS

No. 8 IN A SERIES

DON'T BE CAUGHT WITHOUT A SPARE!

Ever caught without a spare? It doesn't need to happen to you if you own a MASTER Streamline steel tape rule. Spare blades are obtainable at your Hardware Dealer or Mill Supply house . . . or you can use the coupon below. With a "spare" on hand, you can quickly and easily put your Streamline back on its vital job of precision measuring.

The Streamline as a measuring tool has many outstanding features . . . it can be used as a height gauge, scriber or caliper and for inside measuring, layout work and scribing arcs. Graduations on all edges and both sides of the blade. Patented lever lock holds the reading indefinitely.

Write today for your free copy of this new 16-page pocket sized manual "Rules for Measurement."

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WOOD AND TAPE RULES

MASTER RULE MFG. CO., Dept. P-10
815 E. 138th St., New York 54, N. Y.
Branch: 541 S. Spring St., Los Angeles, Cal.

Please send me, at 65c each ..... "spares" —at $2.65 each ..... Streamline Steel Tape rules with spare blade. I enclose $.....

Name .....

Address .....

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IT'S "GO" OR "NO GO"

And ⊗ Marks the Spot

Trained accuracy and split-second timing enable a navy gunner to score a "bull's-eye. So "X" marks the spot where another enemy U-boat goes down. Such feats, all important steps in the winning of the war, are possible because the thousands of small parts that make up our weapons are fitted to work smoothly and flawlessly.

Manufacturing to exact tolerances won't permit even a small degree of guesswork Eliminating faulty parts and helping to build dependable equipment is the important job Kobe Master and Reference gages are doing today. Without these high-accuracy gages the inspector's "GO" or "NO GO" would be worthless, America's industrial leadership impossible.

Every Kobe gage is a precision-engineered instrument built to standards many times finer than those used in the finest of watchmaking. Nothing has been left undone to insure uniform quality. Research has developed the best materials for each type of gage Special treating processes and methods of successful chromium plating were found. Kobe's own manufacturing technique now includes special testing equipment and master gaging which makes that extra degree of exactness possible. It is this constant attention to minute detail that results in gage perfection.

Kobe's modern facilities have been greatly expanded, of course, to meet the heavy demands of war. Out of this experience will come new skill, new planning and many other benefits for post-war industry. Tremendous requirements in the coming peacetime will mean the development of new products, new services, better ways of doing things. When tomorrow's production comes, Kobe's Master and Reference gages will be available—in quantity and quality—to play their part.

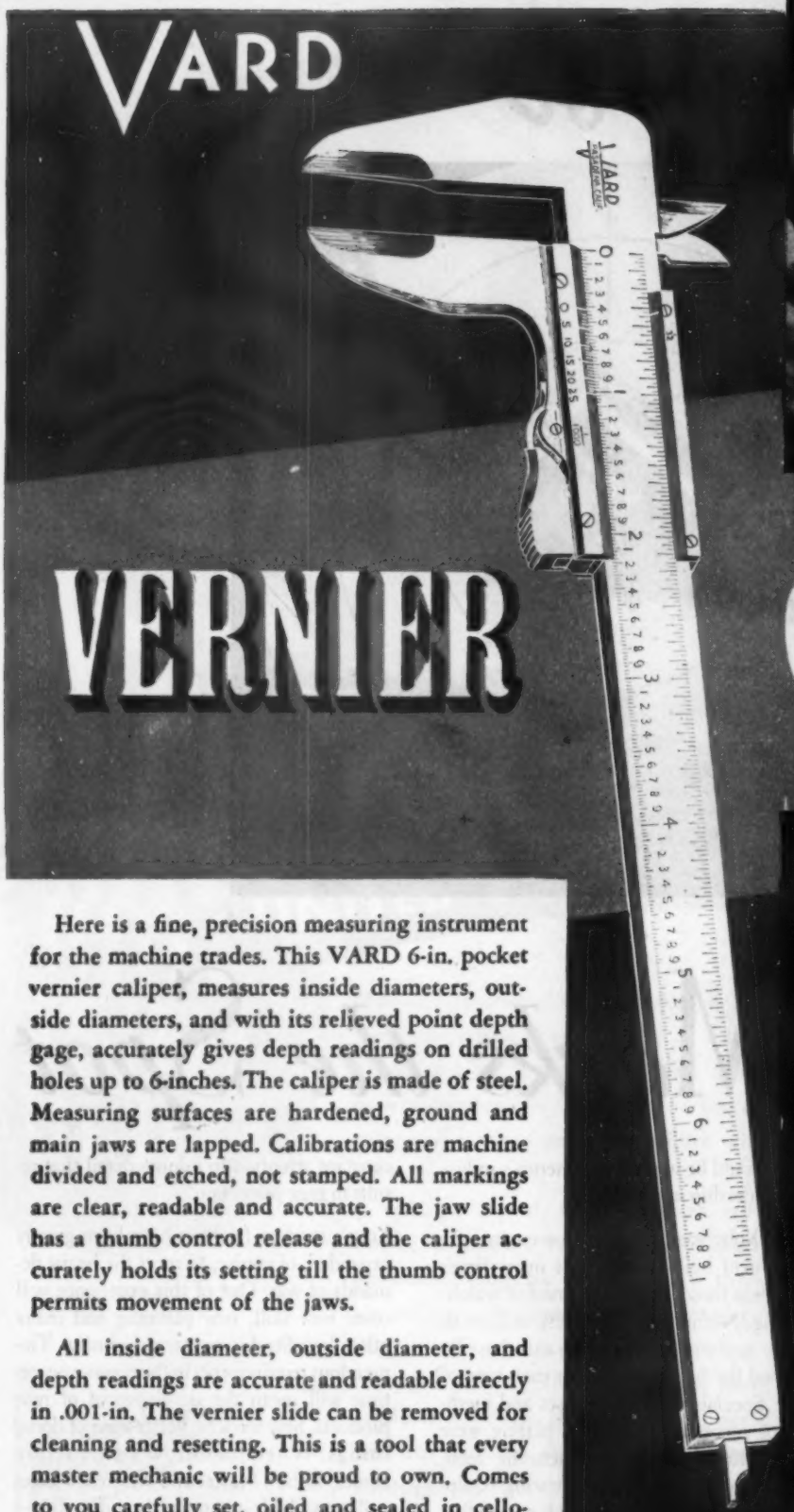
KOBE

Master and Reference GAGES

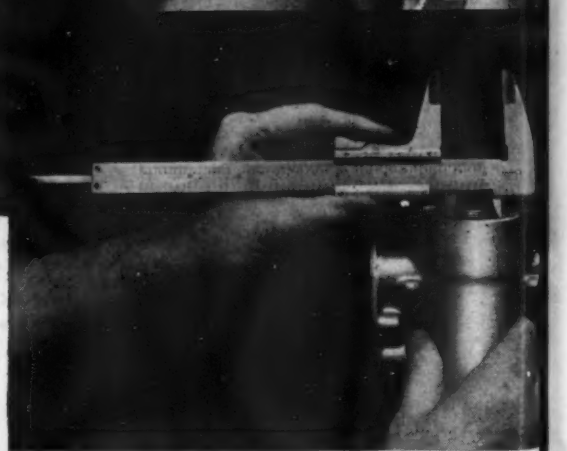
KOBE, INCORPORATED

3040 East Slauson Avenue • Huntington Park, California

VARD



VERNIER CALIPER



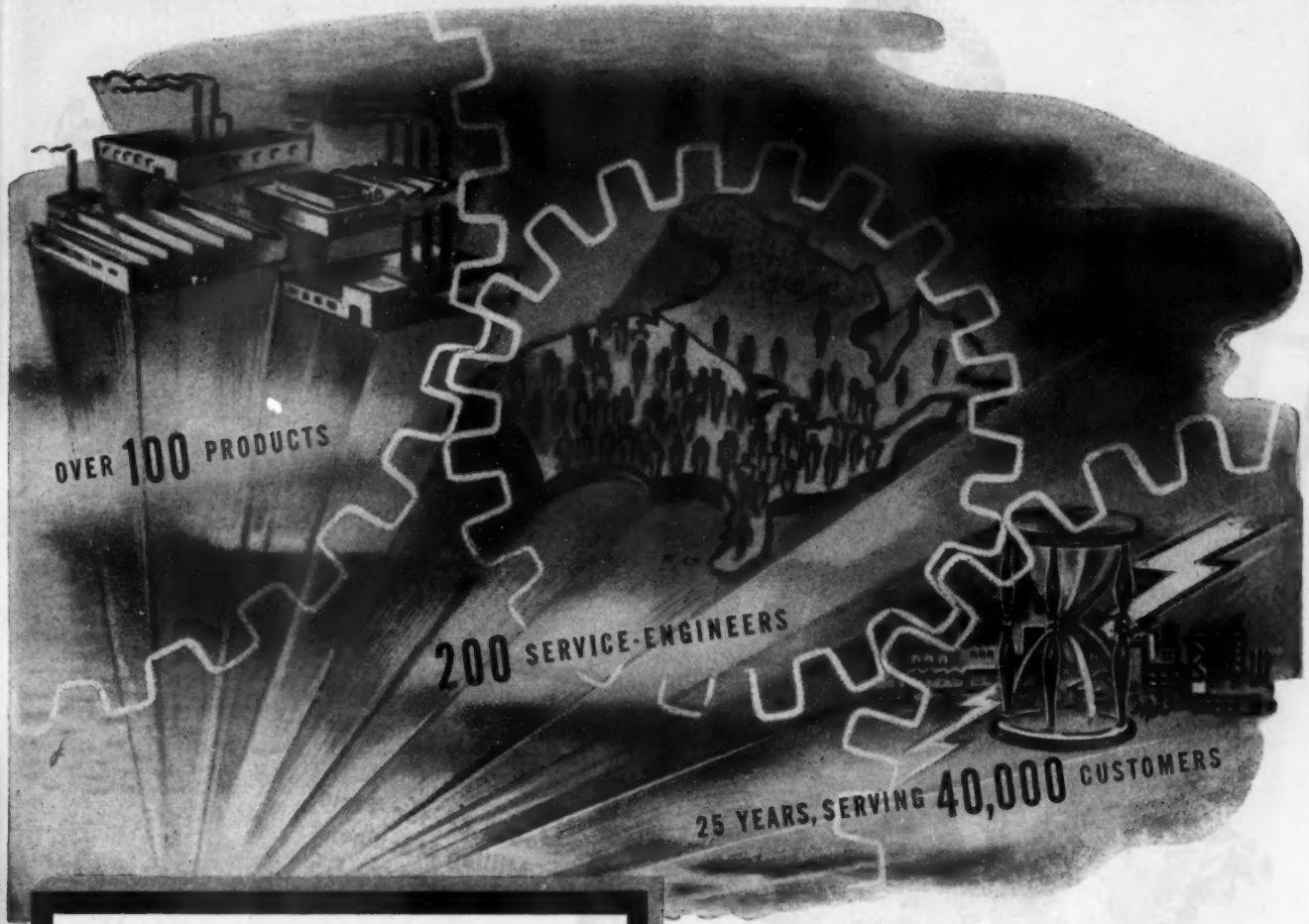
Here is a fine, precision measuring instrument for the machine trades. This VARD 6-in. pocket vernier caliper, measures inside diameters, outside diameters, and with its relieved point depth gage, accurately gives depth readings on drilled holes up to 6-inches. The caliper is made of steel. Measuring surfaces are hardened, ground and main jaws are lapped. Calibrations are machine divided and etched, not stamped. All markings are clear, readable and accurate. The jaw slide has a thumb control release and the caliper accurately holds its setting till the thumb control permits movement of the jaws.

All inside diameter, outside diameter, and depth readings are accurate and readable directly in .001-in. The vernier slide can be removed for cleaning and resetting. This is a tool that every master mechanic will be proud to own. Comes to you carefully set, oiled and sealed in cellophane. Packed in a neat, durable case. Ready to ship on order.

Write for descriptive literature and price sheet.

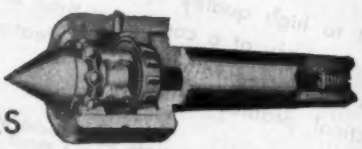
VARD INC.
PASADENA 8, CALIF.

Helping MACHINERY serve America better!



OVER 100 PRODUCTS TO HELP MACHINERY SERVE BETTER

IDEAL LIVE CENTERS



Leading Machine Shops have accepted IDEAL Live Centers as standard because they turn heavier loads—make deeper cuts, at higher speeds. Built with precision thrust and tapered roller bearings. 4 interchangeable inserts for all kinds of centered and uncentered work.

IDEAL ELECTRIC TACHOMETER

Provides Industry with a new step in rotary speed measurement, for testing all laboratory and production requirements. Self-Energizing. Available in 2 Types, "Hand" and "Separable."

IDEAL DEMAGNETIZER

Prevents abrasion, keeps tools sharp, by removing particles of metallic chips, dust, etc. 2 types.

Other IDEAL Products include Magnetic Chucks, Metal Etchers, Grinding Wheel Dressers, Balancing Ways, IDEAL Variable Speed Transmissions, and IDEAL Electric Cleaners.

When war came to America . . . Industry found IDEAL ready . . . a dependable source of supply for over ***100 products*** urgently needed then as now to meet and maintain production schedules. Over ***200*** IDEAL ***Service Engineers*** from Maine to California then, as now, were available to answer calls from ***40,000 customers*** for more and more of the kind of equipment and supplies which IDEAL had developed in over a ***quarter of a century***, specializing in Making Machinery Serve America Better.

Whether you're figuring on the needs of Today or Tomorrow . . . your IDEAL Service Engineer *awaits your call* . . . his knowledge of tools and devices which speed production and cut costs is at your service.

IDEAL's warehouse stocked at plant and in all principal cities and in wholesalers' storerooms assure you of best possible service. A free copy of the IDEAL Handbook illustrating and describing IDEAL Products is yours on request.

IDEAL *Sycamore*

IDEAL COMMUTATOR DRESSER COMPANY

1087 Park Avenue ★ Sycamore, Illinois

L-W UNIVERSAL DIVIDING HEADS

Model AU-Full Universal for Complete Indexing and Spiral Cutting, $194.65

Model BP for Plain Milling Machine, $128.55

● Surprisingly low in price, yet built to high quality standards, the new L-W 11" Universal Dividing Heads offer utmost accuracy at a cost lower than any comparable equipment on the market. The unit is constructed with many new features to increase their accuracy and their use for practical, profitable shop work.

HEADSTOCK—New, ruggedly designed for maximum rigidity. Can be swiveled to any angle.

TAILSTOCK—New design, heavier and stronger.

HEADSTOCK SPINDLE—Tapered bearings, bored for No. 10 B & S Taper. Increased diameter and length. Threaded nose, 2¼" diameter 10 thread USS.

WORM—Made from special alloy steel, accurately finished, and thrust taken by ball bearings. Provisions are made for easy accurate adjustment of worm wheel.

WORM WHEEL—Large diameter, 40:1 ratio, accurately generated, securely mounted on spindle.

EQUIPMENT—⅜" table slot tongues, three index plates furnished, dividing all numbers to 50, and even numbers to 100, with the exception of 96T. Index chart furnished shows all divisions obtainable to 380.

When ordering AU Heads, specify either right or left hand model.

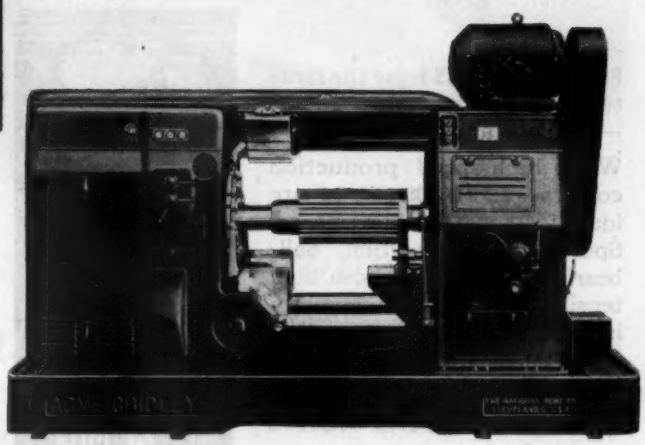
Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products

L-W CHUCK COMPANY

5 N. ST. CLAIR ST.
TOLEDO 4, OHIO

Could you finish both ends at the same time?

Or would you do the job slower on 2 machines?



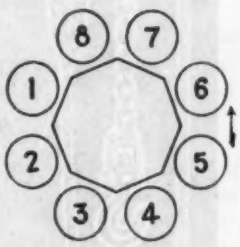
Could you finish both ends at the same time (or would you do the job slower—on 2 machines)?

It's the bronze forged M-20 booster, a war job—tooled for double indexing with 2 sets of tools cutting simultaneously on an ACME-GRIDLEY 8-Spindle Chucker.

These new machines with their adaptability to handling many operations at one time are actually 2½ times faster than the machines of ten years ago—in spite of the tougher alloys, higher tolerances and faster speeds demanded by modern standards.

In the highly competitive markets ahead, ACME-GRIDLEYS will help to turn out better products at lower cost, and therefore lower selling prices. They are more than mere production machines—they are sales producers.

Send for booklet "How Costs Were Cut on 25 Chucking Machine Jobs".



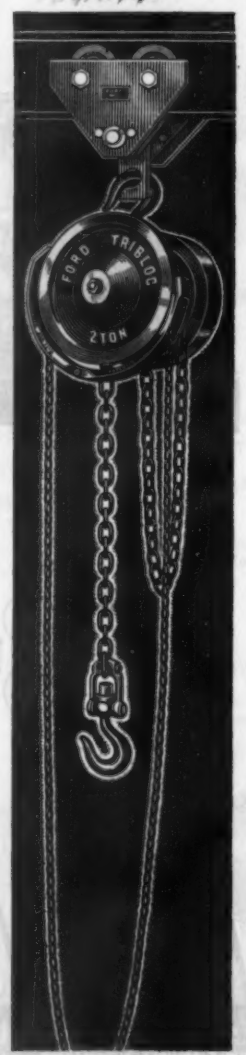
With this machine arranged for double indexing, operations on the large end of the part illustrated were done in spindle positions 2, 4, 6 and 8. The part was then repositioned and the operations on the small end were done in spindle positions 1, 3, 5 and 7. *This one machine did a two-machine job.*

THE NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS
THE CHRONOLOG • LIMIT MOTOR STARTER AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

FORD TRIBLOCS
have his QUALITIES, too



FORD TRIBLOCS have the same two qualities as a powerful horse —strength and speed.

When high-speed production counts—**FORD TRIBLOCS** are ideal for constant hard usage. Spur gear construction, ball-bearing load wheels, both high tensile strength and elasticity in load chain, and many other features assure enduring efficiency. Capacities: ¼ to 40 tons.

FORD SCREW GEAR HOISTS are used where smoothness in lifting and lowering of loads is desirable and where portability is essential. Lightweight; highly portable. Capacities: ½ to 10 tons.

FORD DIFFERENTIAL HOISTS are constructed for light service where speed, portability and price count. Capacities: ¼ to 2 tons.

FORD HOISTS are manufactured by the Ford Chain Block Division of American Chain & Cable, Bridgeport. Offices at Philadelphia, Chicago, Denver, Los Angeles, Portland, San Francisco.

Order from Your Distributor

AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT • CONNECTICUT

QUIKCET . . . for Faster Production —Tighter Holding

Can be set in 4 seconds and released instantly. Ratchet set with side screw powerful fulcrum leverage tightening. 1-hand operation with absolutely non-creeping grip even on irregular surfaces. Setting the pace in war production everywhere.

Ask also about our complete line of Alloy-Steel "C" Clamps with *even greater than* forged clamp capacities, but cost less. Opening sizes up to 18" and proof test capacities up to 19,000 lbs.

Send for new 32-page Catalog

GRAND SPECIALTIES COMPANY
3100 WEST GRAND AVENUE, CHICAGO 22, ILLINOIS

LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

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Famous for

- ACCURACY OF THREADS
- LOW CHASER COST
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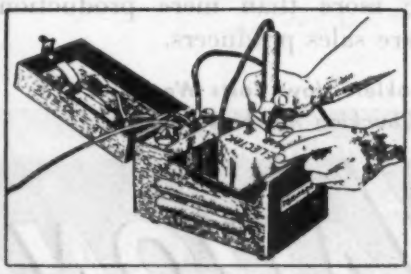
Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt on page 286 of Aug 17 '44 American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Los Angeles: A. C. Behringer, 324 N. San Pedro St., San Francisco: Guy Reynolds, 484 Vernon St., Oakland, Canada: F. Barber Machinery Co., Toronto, Canada.



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TORNADO Electric Etchers and Writing Tools mark everything of value that might be lost, misplaced or stolen. They mark iron, steel, brass, bronze, plastics, glass, etc. Convenient, easy and economical to use.

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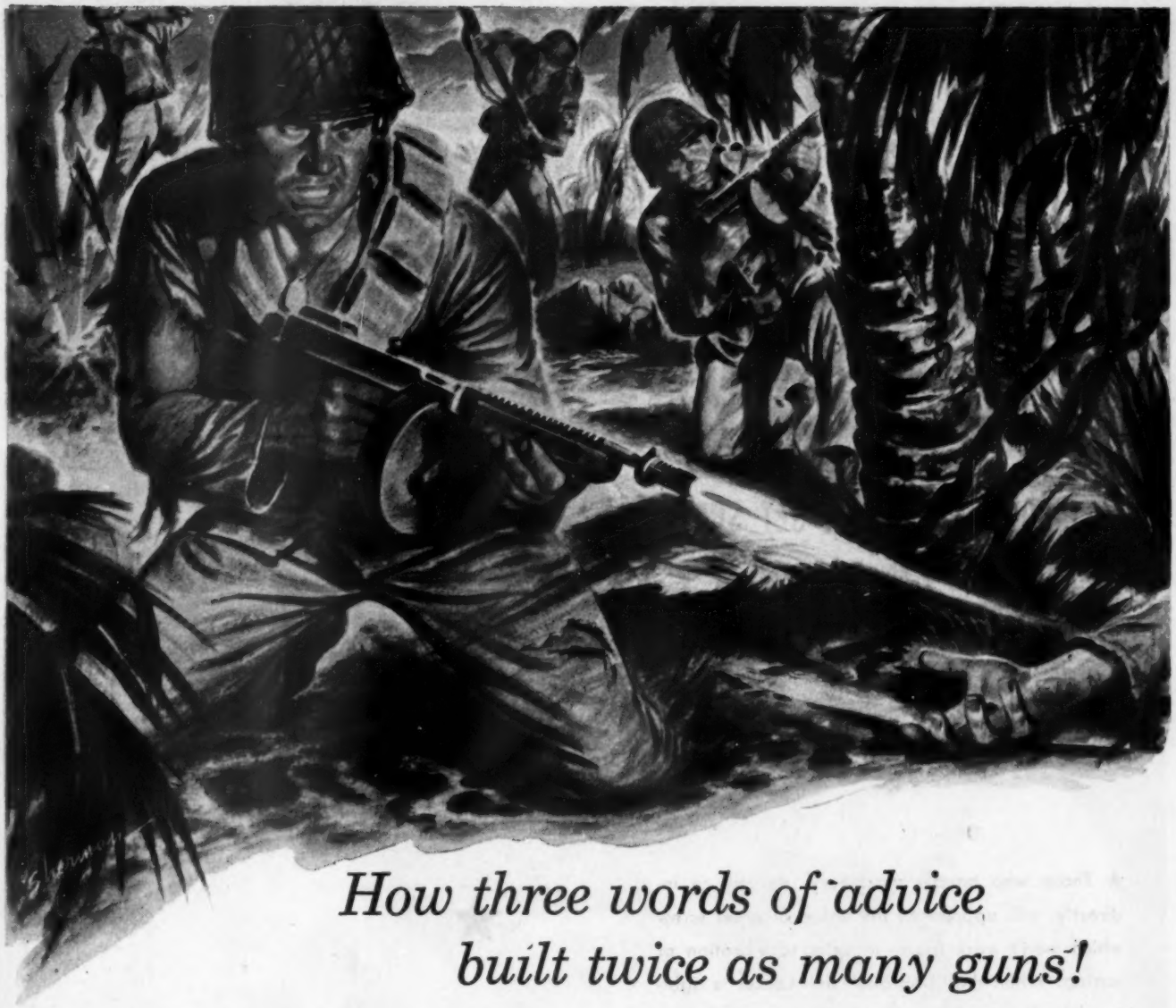
BREUER ELECTRIC MFG. CO., 5084 N. Ravenswood Ave., Chicago, Ill.



How three words of advice built twice as many guns!

A plant was turning out sub-machine guns for the Army. Presently they ran into a tough bottleneck that made things look mighty bad for a while.

The trouble was that one part of the gun had to be made *extremely hard*. This required an extra heat-treating process, which slowed down production.

So plant production men sent for a Gulf Service Engineer. He studied the problem carefully, and said: "*Use Gulf Super-Quench!*"

Gulf Super-Quench is a revolutionary new quenching oil developed by Gulf technologists. The Gulf Service Engineer believed that it would solve the ordnance plant's problem.

And it did!

With Gulf Super-Quench, the ordnance makers not only got the required hardness for the sub-machine gun part without extra heat treating . . . but by eliminating the bottleneck they actually *doubled* their production of these important weapons.

This is just one example of how Gulf's large staff of trained and experienced Service Engineers render aid to thousands of industrial plants, mines, quarries, and construction projects.

In every industry, Gulf has studied the manufacturing processes and equipment, and has developed the proper petroleum product for each specific need. Gulf Service Engineers know just how these products should be applied, and their practical advice and suggestions often result in greater production and lower maintenance costs.

If *you* have a problem involving petroleum products, ask us to send around a Gulf Service Engineer. He offers *real help* that can save you time and money.

GULF OIL CORPORATION
GULF REFINING COMPANY

Gulf Building, Pittsburgh 30, Pa.

GULF INDUSTRIAL LUBRICATION

NO GADABOUT..

THE

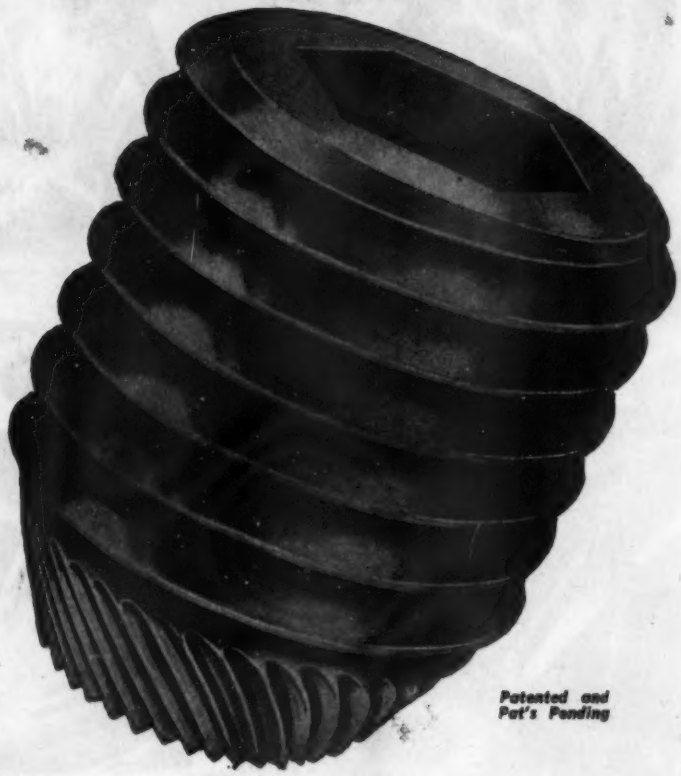
UNBRAKO

Reg. U. S. Pat. Off.

SELF-LOCKING HOLLOW SET SCREW

with the knurled point

STAYS PUT!



Patented and Pat's Pending

★ Those who handle machinery, directly or indirectly, will appreciate the value of a set screw which *won't work loose*—in spite of vibration or jarring. When the "Unbrako" Self-Locker is tightened in the usual way, its *knurled* point digs in, holding the screw tightly in place. Even so, it is easy to remove with a wrench, and can be used again and again.

Sizes from No. 4 to 1½" diameter. Full range of lengths.

Our "Unbrako" catalog is full of interesting information about our Socket Screw Products. Send for your free copy today.

Knurling of Socket Screws originated with "Unbrako" years ago.

★

KNURLED SOCKET HEAD CAP SCREWS

★ Are a great time-saver for busy mechanic. Knurling prevents fingers from slipping—the screw can be turned faster and farther by hand before a wrench is needed.

Sizes from No. 4 to 1½" diameter. Full range of lengths.

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA., BOX 4 • BRANCHES: BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO

A Closer Fit for a Closer Finish

In centerless grinding, where machine performance depends so much on wheel performance, Bay State's exclusive features offer 3 important advantages . . .

1. ***A closer fit of the grade to the grind . . .*** because Bay State wheels are made in "fractional grades"—3 degrees of hardness in a single grade. Wheels, a trifle too hard or too soft are avoided.
2. ***Cooler cutting . . .*** because of their special bond, so strong that wheels can be made more porous.
3. ***Exact duplication . . .*** because of "controlled porosity". Accurate control of size and distribution of pore spaces between abrasive grains assures exact duplication once the proper wheel is determined. "Controlled porosity" is also another means of fitting the wheels to the grind.

Features like these account for the outstanding record of Bay State abrasive products in peace or war. They prove the value of "extras" developed by practical-minded engineers.

If you are interested in ways to improve centerless grinding operations, see what Bay State's 3 exclusive features can do for you. Write for Bulletin A giving complete details and specifications.

BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASS.

BLUE Z FLASH GRINDING WHEELS *FAST and COOL*

GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS
MOUNTED WHEELS AND POINTS · CUT-OFF WHEELS · INSERTED-NUT DISCS · AND CYLINDERS

C-F

POSITIONERS

"Position" Counts Most in this heavy duty Welding Operation

Production welding usually means working on top, bottom and on all sides of the weldment. It means a "quick change" of position should be possible for greater time saving, more efficiency, lower costs and greater safety to men and materials. With C-F positioners a welder can quickly position even the most cumbersome weldments at the press of a button, without crane help or handling crews. With just one set-up of the weldment he can position it easily, speedily and safely, all alone. He can rotate it a full 360° at variable speeds from 0 R.P.M. up, tilt it to 135° beyond horizontal, and can weld, down-hand, all sides, surfaces and angles in the one set-up with larger rods and fewer passes. All C-F positioners, both stationary and portable, are pedestal mounted to give maximum floor and working clearance and all are adjustable for height.

Write for Bulletin WP-22

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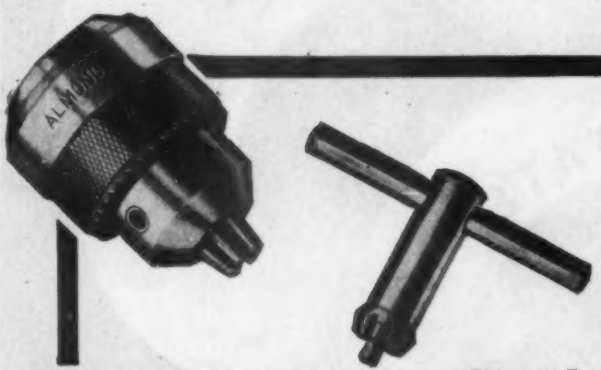

Almond Drill Chuck

THE FIRST IN THE FIELD

ALMOND THREE-JAW DRILL CHUCKS were the first to be placed on the market over Seventy years ago. As Pioneers in the field of Drill Chucks, the name "ALMOND" has long been associated with the logical procedure of machine developments. ALMOND DRILL CHUCKS are made in types and sizes to fit all machine tools and portable drills.

Complete information is available on request.

The Original Manufacturers of Drill Chucks

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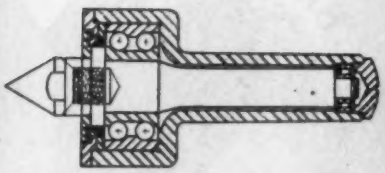

POINTS RUN TRUE

and stay true because center runs on double row angular contact preloaded precision bearing at front end and on stabilizing precision roller bearing at back.

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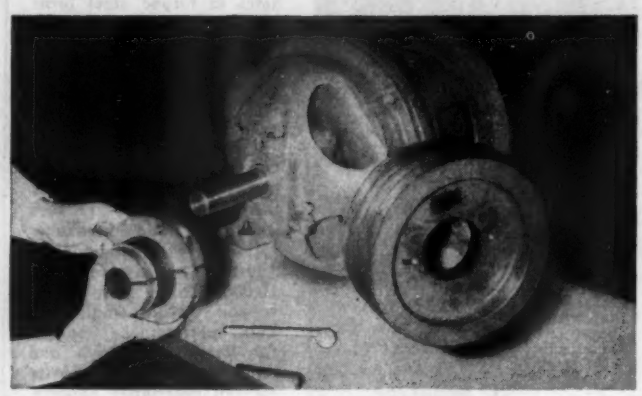
The READY TOOL CO.

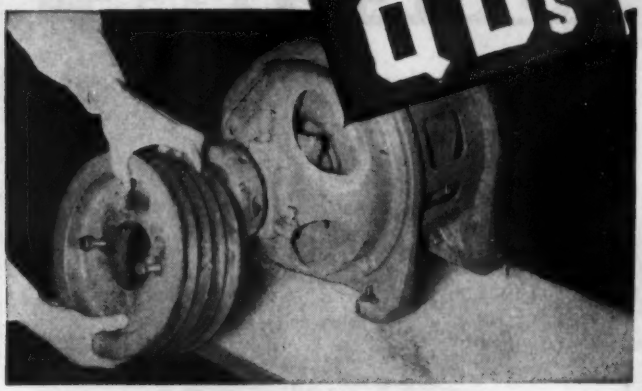
IRANISTAN & R. R. AVENUES

BRIDGEPORT . . . . . CONN.

DO YOU HAVE THESE 3 FEATURES IN YOUR PRESENT SHEAVES?

If so, they must be WORTHINGTON'S QDs





1. EASY TO GET ON

2. EASY TO GET OFF

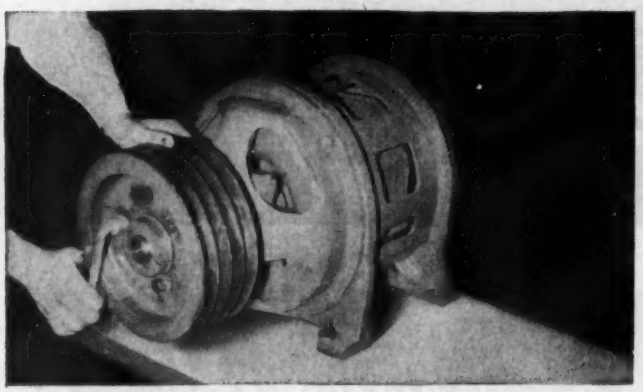
Are you losing time with old-fashioned sheaves? You may be, if you haven't got the QD's time-saving *three* features.

1. Split hub — with taper cone surface for mounting taper bored rim — makes *installation easy*.

2. Pull-up screws usable as jack bolts break Taper Friction Fit, quickly free shaft for bearing maintenance, speed changes, or *quick removal* and mounting of different diameter rims . . . without disturbing the hub. No alignment problems.

3. Bigger pull-up bolts for higher taper cone pressure insure positive clamp grip, keep sheave *always tight on the shaft*.

The sheave with these 3 features, teamed up with Worthington Goodyear Endless Cord V-Belts will give you more for your money. Stock size sheaves and belts at strategic centers from coast to coast.



3. YET ALWAYS TIGHT ON THE SHAFT

Reading Time: 3 Minutes—To Get Accurate Belt Ratings

From the 72-page Master Manual, containing original engineering data . . . sectionalized, loose-leaf, tabbed for ready reference . . . you can select in three minutes the right Worthington V-Belt drive. You get accurate belt ratings . . . avoiding *over*-belting and *under*-belting. Send the coupon today for your free copy! Specification and installation record sheets included.

Centrifugal, Rotary, Steam & Power Pumps | Vertical & Horizontal Compressors | Liquid Meters | Variable Speed Drives | Multi-V-Drives

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We invite your inquiries.

It pays to use Good Tool Steel.

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ARTHUR T. CLARAGE, PRESIDENT
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Only 30 seconds to TAP 1¼" HOLE *in steel*

• This Cleveland Automatic Tapping Machine is tapping 1¼" diameter x 2½" deep holes in forged steel turnbuckles at Edward W. Daniel Company. It is tapping these parts 300% faster than previous method—is maintaining accuracy—and increasing tap life. The lead screw control used on this machine steps up tapping speeds — improves thread accuracy — reduces tap wear and breakage. For example—tapping class 3 threads, as many as 10,000 holes have been tapped with a single tap. This performance speaks for itself—for design and construction features—write for full descriptive bulletin.

Guide for Production Tapping — this pocket size pamphlet contains a lot of useful data on tapping — Write for your copy today.

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TAPPING MACHINES

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Available from Stock
= 0-80 and = 1-72
SCREWS and NUTS
Brass or Steel, Cut Thread
Class 3 Fit

Waltham is also equipped to furnish all types of
SPECIAL MACHINE SCREWS and SCREW MACHINE WORK
manufactured to special order.

Write for Catalog and Price List.

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Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

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(Automatic and Semi-Automatic)
LELAND GIFFORD CO.
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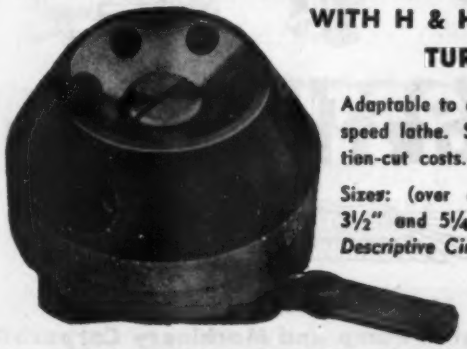
MAKE YOUR LATHES MORE PRODUCTIVE WITH H & H 6 TOOL TURRETS



Adaptable to any engine or speed lathe. Speed production-cut costs.

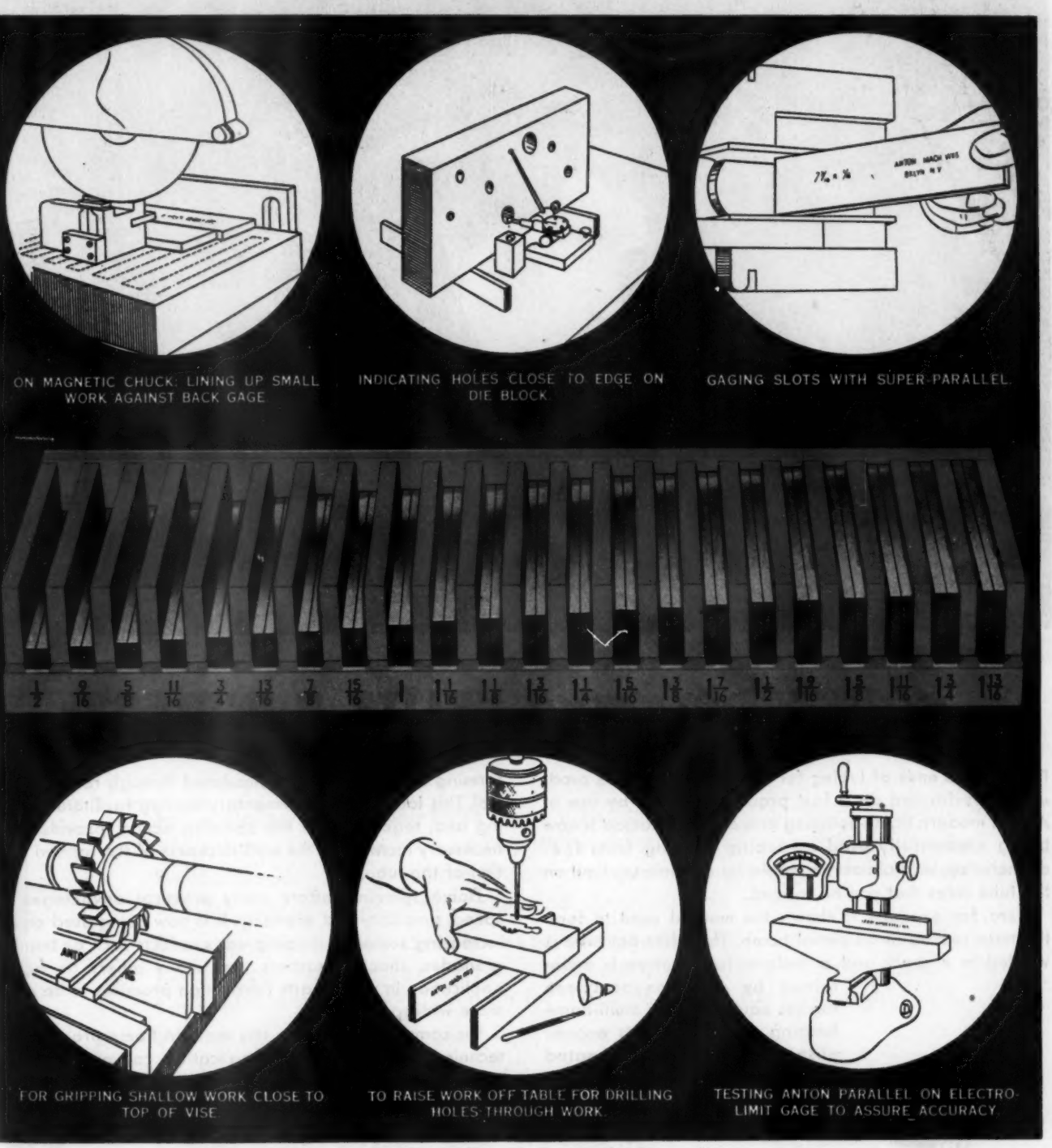
Sizes: (over all dia.) 3", 3½" and 5¼". *Write for Descriptive Circular.*

H. & H. MACHINE TOOL CO., Waltham, Mass.

ANTON PARALLELS

- **PERMANENTLY STRAIGHT AND ACCURATE**
- **PRICE FOR COMPLETE SET.....$85.00**

Using and Testing Anton Hardened Parallels:



ON MAGNETIC CHUCK: LINING UP SMALL WORK AGAINST BACK GAGE.

INDICATING HOLES CLOSE TO EDGE ON DIE BLOCK.

GAGING SLOTS WITH SUPER-PARALLEL.

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FOR GRIPPING SHALLOW WORK CLOSE TO TOP OF VISE.

TO RAISE WORK OFF TABLE FOR DRILLING HOLES THROUGH WORK.

TESTING ANTON PARALLEL ON ELECTRO-LIMIT GAGE TO ASSURE ACCURACY.

Guaranteed ± .001 in size; ± .0001 in parallelism and straightness within length

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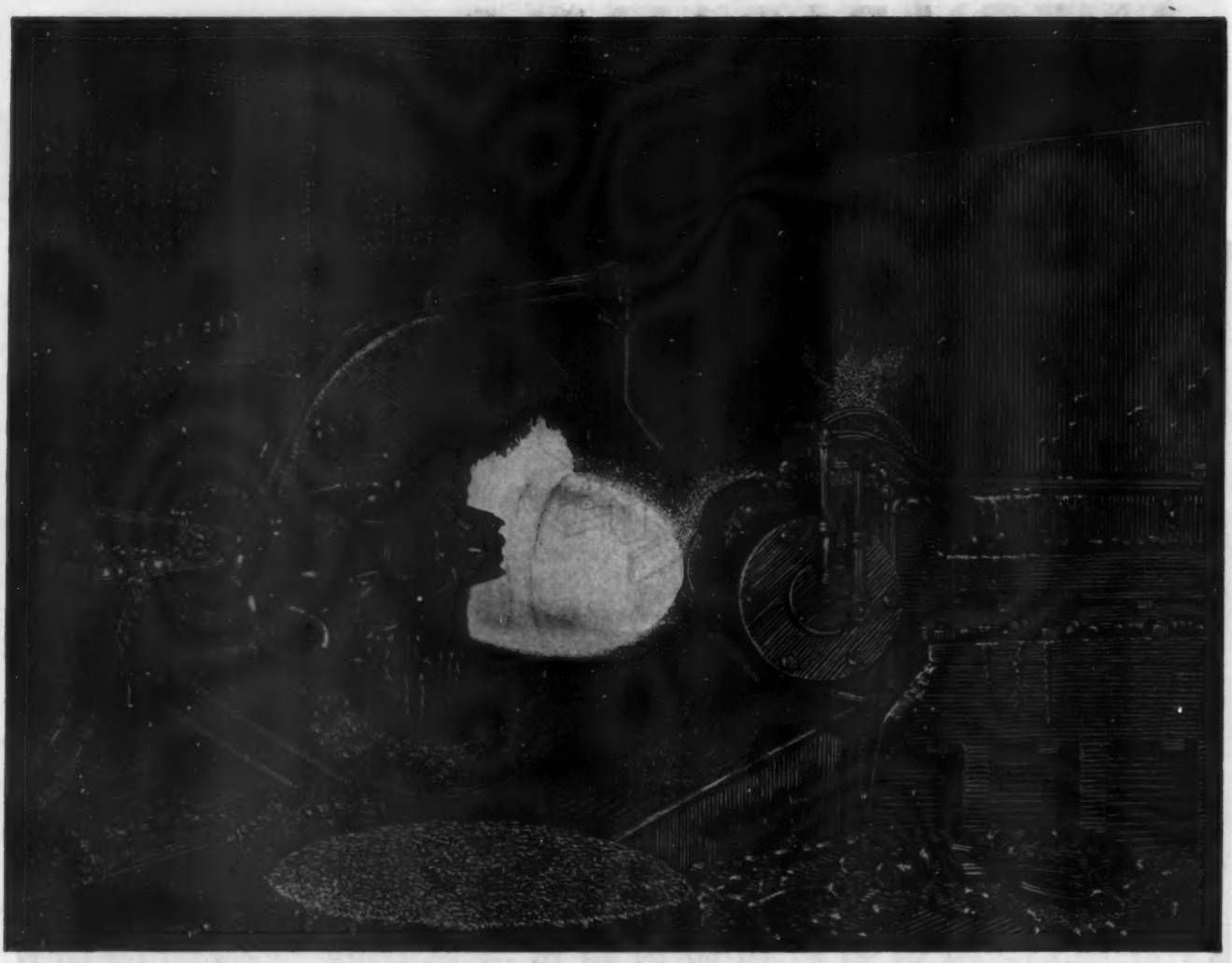

Flame Spinning "BLITZ BUNDLES"

Forming the ends of tubing for war and peace-time products is performed on a fast production basis by use of Airco's modern flame-spinning process. This method is now being successfully used on tubing ranging from 1/2" diameter up, with almost no maximum or minimum limit on the tube sizes that can be formed.

Here, for example, is shown the method used to form the nose section of an aerial bomb. The white-hot tube is whirled in a chuck and a uniform temperature is maintained by Airco oxyacetylene torches equipped with multi-flame heating tips. Forming is accomplished by bringing the heated end of the tube in contact with a forming roller, which is manipulated through remote control. This localized supplementary heating facilitates forming and, together with the spinning action, provides the necessary increase in the wall thickness of the formed section of the tube.

Flame spinning offers many practical advantages in speed, simplicity and economy. It is now being used on an increasing scale for shaping war products such as bombs, grenades, shock-absorbers, and many others. Its future application in metal parts fabrication promises to be even more widespread.

For complete details on this modern flame process and technical assistance in its application, call or write your nearest Airco office, or write to Dept. S, New York Office.

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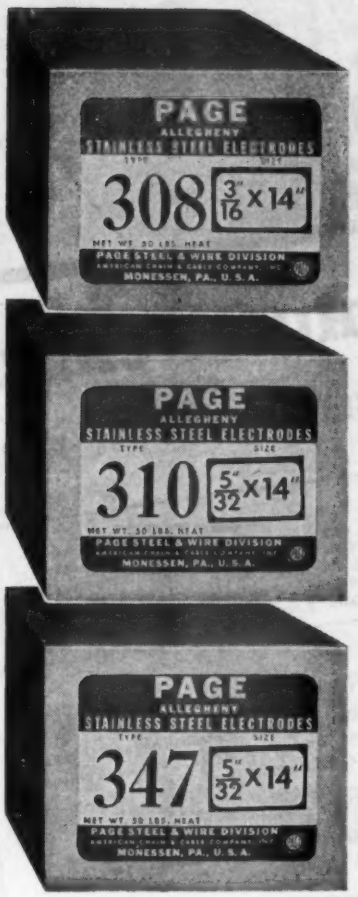
PAGE *Welding* ELECTRODES



. . . FOR ANY KIND OF WELDING

for welding Stainless • **PAGE** offers a complete line of electrodes, developed in cooperation with the world's largest producer of Stainless Steel. Coatings on **PAGE** *Allegheny* Stainless Steel Electrodes are constantly checked for uniformity, so that your good welders can depend upon uniform welds.

for welding Carbon Steels • **PAGE** recommends Hi-Tensile "C" Shielded Arc Electrodes. For vertical, overhead or horizontal welding of carbon steels, these electrodes can be depended upon for welds that pass the most rigid tests.

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In Business for Your Safety

BETTER SHOP PRACTICES TODAY

are part of your Post War Planning

● There is no doubt about the fact that many shop practices dictated by today's crying need of top efficiency production will carry over into greatly improved production practices in the postwar era.

Education of shop men in methods of tool conservation, for example, has been a war necessity, but can become a definite profit item for you in postwar competitive production. Thus today the Cushman Chuck Check Card helps prolong the life of these fine precision tools for more effiicient war production, but its use in your plant can well form part of a plan for greater efficiency in shop operation that will find your organization better prepared for postwar production . . . better able to make a profit in postwar competition.

CHUCK-V-CHECK

A STITCH IN TIME FOR VICTORY

The chuck on your machine needs a LITTLE attention REGULARLY. Neglect of these rules will affect the accuracy of your work and cause "down time". Chucks are essential war production tools. "Keep 'em running to keep 'em flying."

1. Check lubrication on every shift.
2. Wipe surfaces . . . especially spindle noses and bearing surfaces . . . CLEAN of chips, etc. before mounting.
3. Never FORCE chuck on spindle nose.
4. Keep keyways, jaw bearings free from dirt, chips, etc.
5. Do NOT open jaws beyond outer edge of chuck circumference (use larger chuck if necessary)
6. Use correct jaw equipment for work to be held.

CUSHMAN CHUCKS

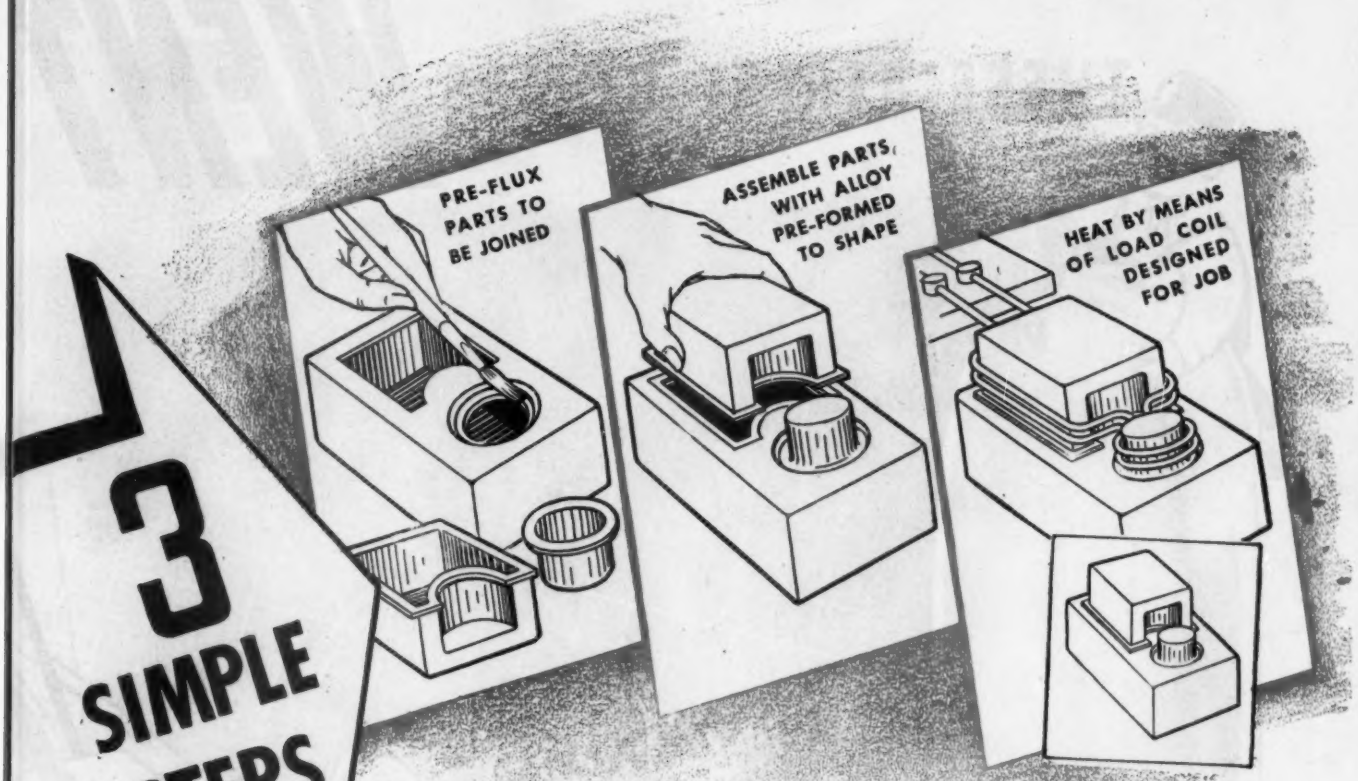
A WORLD STANDARD FOR PRECISION

THE CUSHMAN CHUCK CO. HARTFORD, CONN.

We will be glad to supply a quantity of Chuck Check Cards for use in your plant and suggest that they be posted near all machines using Cushman Chucks.

CUSHMAN CHUCKS

A WORLD STANDARD FOR PRECISION



3 SIMPLE STEPS to BETTER METAL JOINING — *FASTER* and at LOWER COST

Many manufacturers, seeking faster and better methods of assembling metal parts to meet war production demands, have found the answer — and important economies — in brazing and soldering by the Lepel Induction Heating process.

Using brazing and soldering alloys of any melting point, Lepel Induction Heating reduces the most intricate metal joining jobs to three simple operations, so easy that women or unskilled workers can perform them with a minimum of training. Frequently, intricate jobs, impractical by other metal-joining methods, can be performed in a few seconds — often with gang set-ups that raise production to astounding levels.

Quality is improved because the human element is eliminated, time cycles are automatically controlled, and the heat is generated within the metal, assuring thorough penetration of the alloy.

"Runs" are rare since only the required amount of alloy is used and, since excessive heating is impossible, discoloration is minimized and scaling practically eliminated. Thus, little, if any, cleaning up or refinishing is necessary.

If you have a metal joining problem — present or projected — involving ferrous or non-ferrous metals, or both, a Lepel field engineer will be pleased to call to discuss the advantages and possibilities for economy which Lepel Induction Heating offers.

Lepel High Frequency INDUCTION HEATING UNITS

LEPEL HIGH FREQUENCY LABORATORIES, INC.
PIONEERS IN INDUCTION HEATING
39 W. 60th STREET NEW YORK 23, N. Y.

THESE AERIAL BOMBS WENT

INDUSTRIAL TYCOL OILS-GREASES

FINER FINISHES

The finer finishes achieved with Tycol cutting oils are exemplified by the experience of one big eastern ordnance producer. Finishes improved on cylindrical and centerless grinding of shells, using a 40 to 1 Tycol mix—half the concentration previously required.

UP FROM 3 TO 21

BETWEEN TOOL GRINDS

when this plant changed to TYCOL SOLUBLE CUTTING OIL!

Here's another actual case that emphasizes Tycol's ability to step up production and increase tool life:

Tool performance was far from satisfactory in a big ordnance plant producing 2000 lb. aerial bombs. Regrinding was necessary after machining every 3 bombs.

Then they switched to Tycol 678 Soluble Cutting Oil and an immediate improvement resulted. Now seven times as many bombs are machined between tool grinds—up from 3 to 21 per grind!

This is just one case among many that illustrate the industry-wide superior performance achieved by Tycol cutting oils. No matter what your requirement—from tapping tiny nuts to boring giant gun barrels—there is a Tycol cutting oil "engineered" to do the job faster, produce finer finishes and lengthen tool life.

Call or write your nearest Tide Water office for the complete story. Tide Water engineers will recommend the correct Tycol cutting oil for your need.

TIDE WATER ASSOCIATED OIL COMPANY

Makers of the famous VEEDOL MOTOR OIL

Eastern Division: 17 Battery Place, New York 4, N. Y.

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Gasoline Powers the Attack— Don't Waste a Drop!

MS! DRUMS! DRUMS! WAR NEEDS MAKE IT EXTREMELY IMPORTANT THAT ALL EMPTY DRUMS BE RETURNED IMMEDIATELY.

LONGER TOOL LIFE

Longer tool life to the tune of 1,181% for taps per grind was obtained when this manufacturer switched to Tycol Soluble Oil. The taps now tap 2,480,000 nuts as compared with the 210,000 before using Tycol.

FASTER CUTTING

Tycol Sulphurized Cutting Oil speeded up gun boring 84% for an ordnance plant—from 68 to 125 inches per hour! Better finishes, more accurate boring resulted, too, because Tycol eliminated excess build-up on tool edges.

LOOK TO PARKER

FOR THE VITAL LINK IN FLUID POWER

Think of fluid power as the three-link chain: Source—Circuit—Utilization.

The Circuit is the *key link.* It may go around corners and into tight places. It may even be vulnerable. Too often it is just taken for granted.

The success of fluid power depends on the engineering of the Circuit. That is Parker's business.

We do the engineering from design through to installation. We build the valves and fittings and the tools to handle them.

Our specialized know-how distilled from twenty years' experience with Fluid Power System is at your command.

The best way to get this know-how applied to your problem is to ask a Parker engineer. Or write direct to The Parker Appliance Company, 17325 Euclid Ave., Cleveland 12, Ohio.

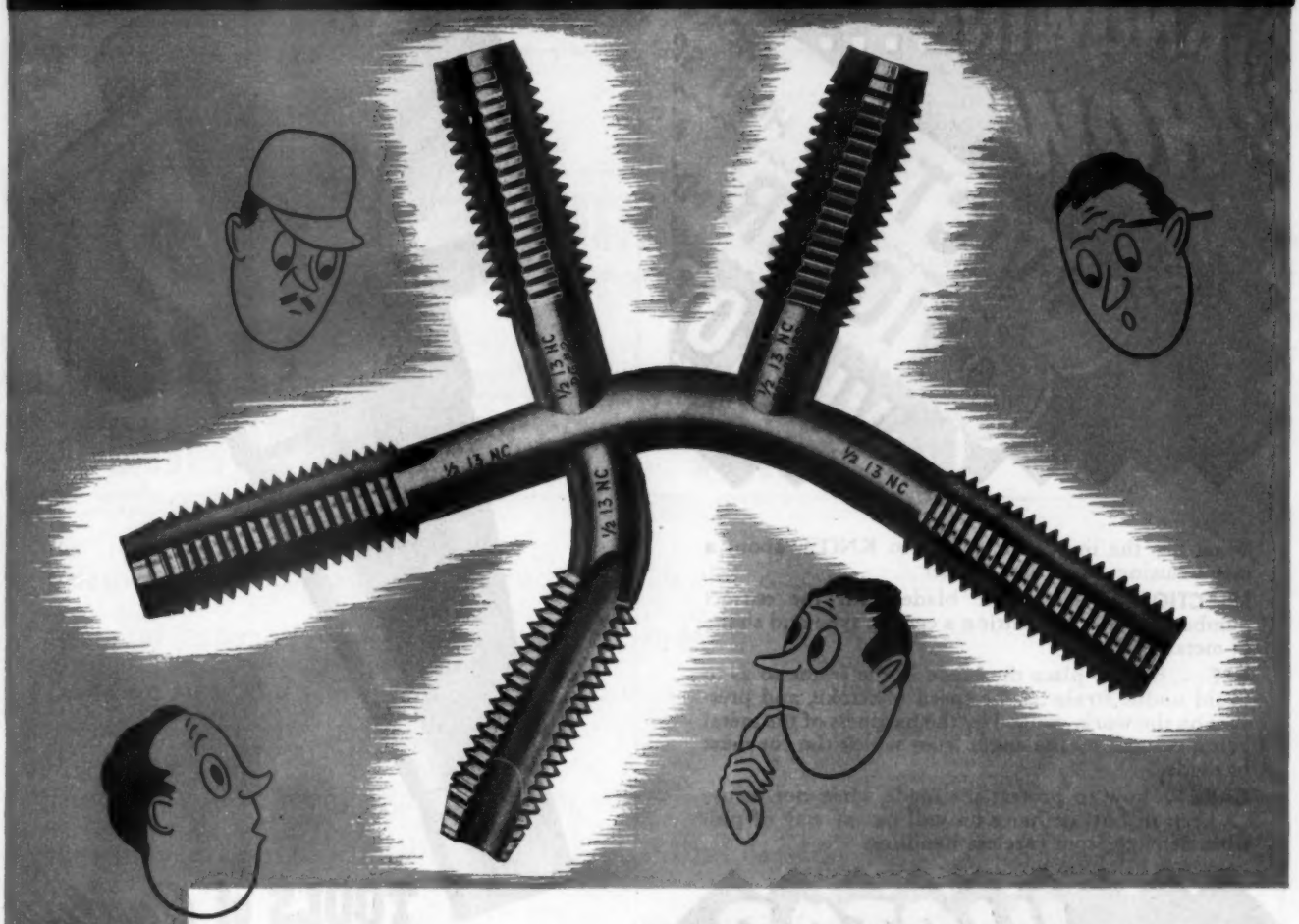
PARKER SELECTED TO DISTRIBUTE SURPLUS WAR STOCKS OF PRECISION VALVES AND FITTINGS

Recognizing that users of precision valves and fittings would be served best by having war surpluses made available through an organization with broad application experience, Metals Reserve Company has appointed Parker to be a distributing agent. For details on type, quantity, specifications and application of this very large stock, write, wire or telephone

PARKER SERVICE AGENCY
17325 Euclid Avenue Cleveland 12, Ohio
agent for
METALS RESERVE COMPANY

THE **PARKER** APPLIANCE COMPANY
CLEVELAND · LOS ANGELES

An ALL-PURPOSE TAP?



..there ain't *NO SUCH THING!*

But, there *is* a tap for every purpose! Every material, almost every type of threading job, requires a particular tap or die built to do the particular job.

Don't waste time and money experimenting when you meet new thread-cutting problems. The Greenfield Tap and Die Corporation maintains a complete staff of field men and factory engineers whose accumulated experience in all phases of thread-cutting is readily available to you.

ARMY (E) NAVY

GTD GREENFIELD

SIMPLY CALL YOUR "GREENFIELD MAN" THROUGH YOUR GREENFIELD DISTRIBUTOR

GREENFIELD TAP and DIE CORPORATION • Greenfield, Massachusetts

IT'S ALL IN THE KNOWING... HOW

What are the important things to KNOW about a metal-cutting Hack Saw Blade?

SELECTION... the proper blade with the correct number of teeth, for cutting a certain type and shape of metal.

USE... how to place the blade in the frame so as to avoid undue strain... the speed of stroke, and pressure on the work, gauged by the hardness of the metal being cut and by the angle from which the cut must be made.

CARE... how to protect the blade when not in use ... keep in box, or hang on nail out of way of possible damage from careless handling.

LET VICTOR TELL YOU HOW

All these points, and many more just as important, are discussed in detail, with appropriate illustrations, in the pocket-size instruction manual "Metal Cutting." Use the coupon below to get your copy. It's FREE.

VICTOR SAW WORKS, INC.
MIDDLETOWN, N. Y.
Makers of hand and power hack saw blades, frames, and metal cutting band saw blades

VICTOR HACK SAW BLADES

VICTOR SAW WORKS, INC.
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Please send me a copy of your booklet "Metal Cutting."

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TOOLS of *Quality* for *Quantity* PRODUCTION

Noted for maintaining original accuracy over a longer period. Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. LEAD SCREW IS HARDENED TOOL STEEL, WITH THREADS GROUND FROM SOLID AFTER HARDENING. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

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MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

FENN FOR SPECIAL MACHINERY

FENN FOR SPECIAL TOOLS

FENN FOR SPECIAL PARTS

Reconversion to peacetime production is the problem that every manufacturer faces. Plans may necessitate redesigning present machines and building new ones. There is no time to waste.

The survival of many plants will depend largely upon the careful planning that they do now for machines and tools to be used in postwar production.

When you engage FENN to build your special machinery you gain the benefit of their sound practical shop experience, their knowledge of machine design which has been accumulated through *three generations.*

Fenn Engineers invite inquiries from concerns who are looking for ways to make their product better, faster, or for less money — concerns that are ready to talk about production at a profit.

THE FENN MANUFACTURING COMPANY

Hartford, Connecticut

Builders of Better Machinery To Meet New Demands

GREATER POWER!

PROVIDES *MORE WORK DONE FASTER—at less cost!*

WITH *Thor* PORTABLE ELECTRIC TOOLS

Thor ¼-inch plastic-housed drill—drilling holes in top structure of plane fuselage.

Quota-smashing performances of Thor Portable Electric Tools in war production bring convincing new proof of Thor operating and money-saving advantages that will save you time and costs on scores of "tomorrow's" jobs!

With a *Thor*, you can put to work on any job the tool with the power and durability for *most work done*, shift after shift . . . with the lightness and handling ease for *faster work*, less time and money lost due to operator fatigue.

GREATER POWER LONGER SERVICE

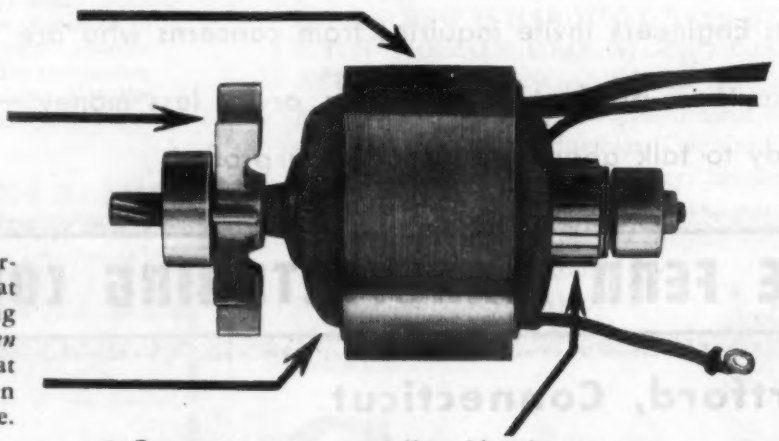
THRU THOR MOTOR CONSTRUCTION

For *power* that goes beyond maximum to a reserve that will carry momentary overloads . . . for *longer service* on all types of jobs from intermittent running to continuous production, the expert winding and assembly of Thor electric motors offer these advantages:

- Armatures are wound by a method that ties Thor coils tightly to *minimize expansion*—to insure longer motor life.

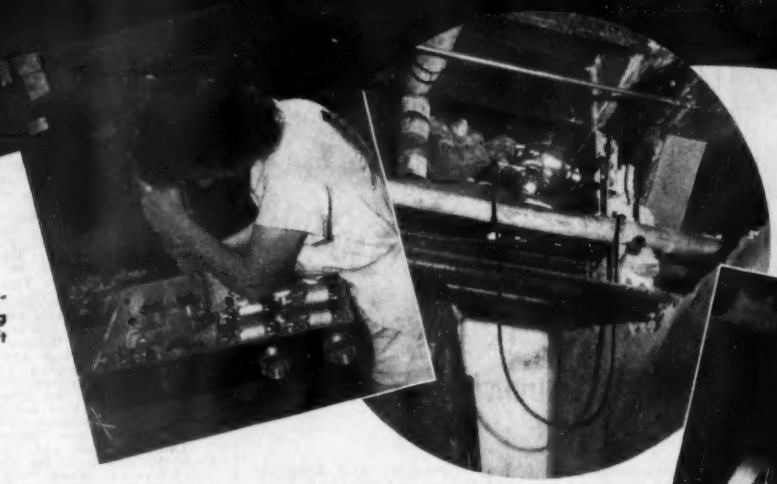
- Together with an oversize fan that provides *cooler running*, armatures are *balanced as a complete assembly* so the motor will run true and smooth, with a minimum of vibration.

- Motors are soaked in varnish and thoroughly baked at a high temperature, providing an armor that *will not soften* under the severest load—that helps prevent shorts, broken wires, or grounded armature.



- Commutators are specially soldered with *even heat* across the entire unit to further reduce expansion—to *prevent distraction of current.*

• • • BALANCED WITH LIGHTER WEIGHT



Thor electric screwdriver—driving screws on aircraft instrument panel.

Thor electric hammer—reaching into a tight corner to smash loose plaster in wall opening.

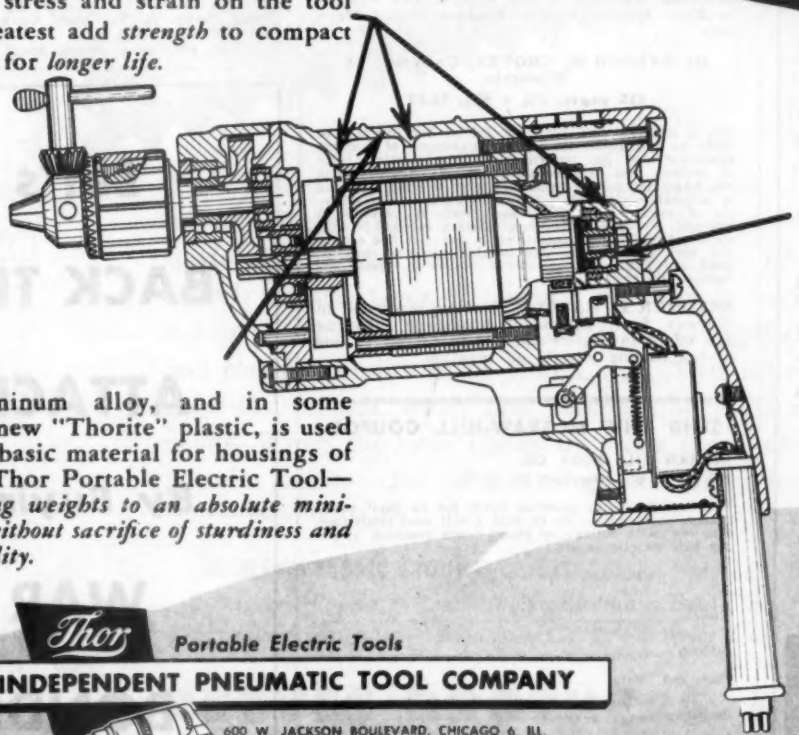
Thor electric grinder—removing rough edge from steel braces.

Thor electric sander—smoothing exterior planking on wooden minesweeper.

LIGHTER WEIGHT—COMPACT STRENGTH IN Thor HOUSING CONSTRUCTION

For *lighter weight* that reduces operator fatigue, provides ease in handling and more work per shift . . . for *strength* and *durability* combined with light weight that stands up longer on every job, Thor offers these construction advantages:

• Webbing reinforcements at points where stress and strain on the tool are greatest add *strength* to compact design for *longer life.*



• Aluminum alloy, and in some cases, new "Thorite" plastic, is used as the basic material for housings of every Thor Portable Electric Tool—*reducing weights to an absolute minimum without sacrifice of sturdiness and durability.*

• One-piece construction of bridge and housing carries the upper bearing in perfect alignment with the lower bearing on most Thor tools—providing *quick* accessibility for servicing the commutator, brushes, holders and connections.

(NOTE—*These construction features shown on a Thor ¼" Drill are typical of all Thor Electric Tools.*)

Thor *Portable Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

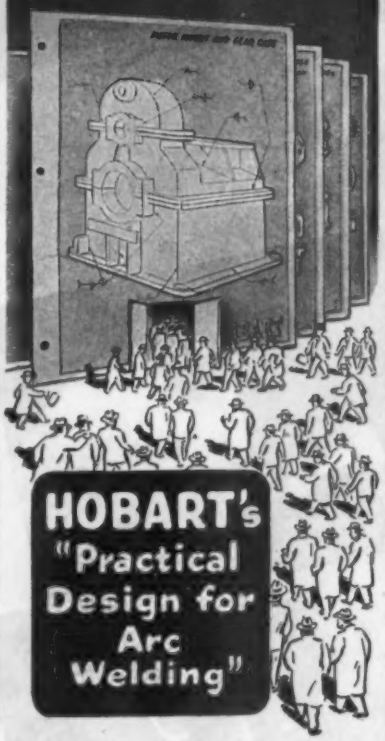
600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

Branches in Principal Cities

For particulars of still more advantages of Thor Portable Electric Drills, Screwdrivers, Nut Setters, Grinders, Sanders, Hammers, and Saws, as well as complete specifications and prices, call your nearest *Thor* representative today, or write for Catalog No. 38.

JOIN THE THOUSANDS

who are enrolling for this service—



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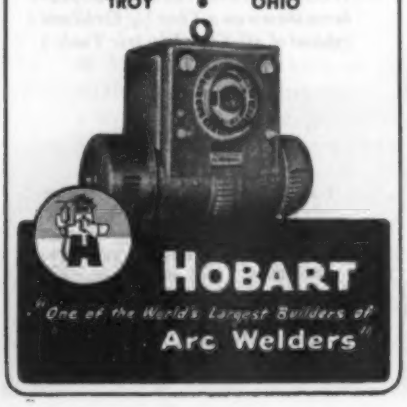

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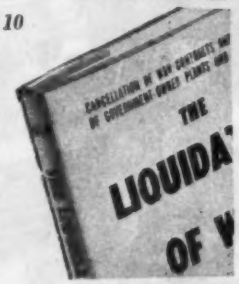

Here are the results of two of several research studies made and being made by the Committee for Economic Development, to provide factual information for forming a sound post war economy.

1. THE LIQUIDATION of WAR PRODUCTION

*Cancellation of War Contracts and Disposal of Government-owned Plants and Surpluses

By A. D. H. KAPLAN, University of Denver
133 pages, 5¾ x 8¾, $1.50

How will our war production be liquidated? To aid businessmen in considering their own specific questions of conversion, this new study surveys the problem and suggests definite policies and methods of solution. Is it realistic to treat transition to peace production as a back-to-normalcy movement? What will be the areas of distress requiring help until a peacetime balance can be restored? In many such aspects, the reconversion problem is examined. The issues, facts, figures are extracted, placed in proper perspective, and simply stated, and 41 concrete proposals are made for a program providing for a smooth transition to desirable postwar levels of production, employment and wages.

Dr. SUMNER H. SLICHTER: "I am enthusiastic about this report. It is realistic and to the point."

2. PRODUCTION, JOBS, and TAXES

*Postwar Revision of the Federal Tax System to Help Achieve Higher Production and More Jobs

By HAROLD M. GROVES, University of Wisconsin
115 pages, 5¾ x 8¾, $1.25

Can a moderate and equitable federal tax program be made an instrument for the encouragement of business enterprise and job opportunities? The starting point of analysis and recommendation for all concerned with this important problem, this book discusses many aspects of corporation and personal taxes, gives a concise analysis of plans old, current, and new. It presents 16 clear-cut proposals—shows how taxation compatible with social principles and economic needs may also free capital and lend attraction to risk so that business concerns, small and large, may operate to provide increased production and employment.

SEYMOUR E. HARRIS: "No one interested in postwar fiscal policies and postwar planning can afford to neglect this timely volume by one of the leading experts on taxation."

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LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of American Machinist, published weekly at New York, N. Y., for October 1, 1944.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Joseph A. Gerardi, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Co., Inc., publisher of American Machinist and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the name and address of the publisher, editor, managing editor, and business managers is: Publisher, McGraw-Hill Publishing Company, Inc. Editor, Burnham Finney; Managing Editor, John Haydock; Business Manager, W. F. Kennedy; all of 330 West 42nd Street, New York 18, N. Y.

2. That the owner is: McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York City. Stockholders holding 1% or more of stock: James H. McGraw; James H. McGraw, Jr.; James H. McGraw, Jr., Curtis W. McGraw and Edwin S. Wilsey, Trustees for: H. W. McGraw, J. H. McGraw, Jr., D. C. McGraw, C. W. McGraw; Curtis W. McGraw, Donald C. McGraw; all of 330 West 42nd Street, New York City; Edwin S. Wilsey and Curtis W. McGraw, Trustees for J. H. McGraw, 3rd, Madison, New Jersey; Mildred W. McGraw, Madison, New Jersey; Wilson C. Laucks, Spruce and Canal Sts., Reading, Pa.; Grace W. Mehren, 73 No. Country Club Dr., Phoenix, Ariz.; Margaret Stump, 1418 Rose Viginia Rd., Wyomissing Park, Reading, Pa.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain not only a list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

J. A. GERARDI, Secretary.

McGRAW-HILL PUBLISHING COMPANY, INC.

Sworn to and subscribed before me this 29th day of September, 1944.

[SEAL] ELVA G. MASLIN.
Notary Public, N. Y. County Clerk ₮806—
Reg. ₮480-M-6

(My commission expires March 30, 1946)

Let's BACK THE ATTACK By Buying WAR BONDS

FOR A FABRIC THAT DELIVERS THE GOODS — *DEMAND*

REEVES ARMY TWILL

"FROM COTTON TO CUTTER"

The country's leading bottlers specify *invasion tested* Reeves Army Twill. Whatever the industry, if uniforms are needed, this top-quality fabric tailors smartly and gives superb service. Over 80 million yards of it have already been used to help equip America's fighting men, and it is proving itself under the toughest climatic and combat conditions of global war. This fabric, Sanforized Shrunk* and color-fast to sun, water and perspiration, will meet *your* post-war uniform needs. When the time comes to order them, choose from a wide range of popular colors — for long-lasting good looks insist on Reeves Army Twill.

**Residual shrinkage less than 1%*

THE REEVES FABRIC GROUP INCLUDES: *Reeves Army Twill • Glengarrie Poplin • Reeveking Gabardine • Byrd Cloth • Marine Herringbone • Mountain Cloth • Warrior Twill*

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PALMGREN
ANGLE VISES

DRILLING
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Solve Difficult Angle Jobs

- ★ For Tool Room—Production Line—Bench.
- ★ Speed up work—End Makeshift Methods.
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- ★ Sturdy Longlife Construction.
- ★ All Parts Accurately Machined.
- ★ Jaws Hardened Steel—Plain or Grooved.
- ★ Made in Sizes from 1½" to 8" Jaws.

Write for circular 8345 "102 Angle Operations" and complete line of PALMGREN Vises.

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CHICAGO TOOL & ENGINEERING COMPANY
Mfrs. of PALMGREN PRODUCTS for over 25 years
8345 South Chicago Avenue, Chicago, Ill.

PRECISION WORK AT ANY ANGLE

BUZZER *Gas* BURNERS

For Many Industrial Gas Uses

NO BLOWER or POWER NECESSARY
. . . just connect to gas supply

Pipe Burners

Nozzle Burners

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Designed to solve numerous Industrial Gas applications, "BUZZER" Burners are unexcelled for Efficiency, Economy, Simplicity and Flexibility. Large variety of models available.

Send for the "BUZZER" Catalog showing complete line of Industrial Gas Burners, Furnaces and other equipment.

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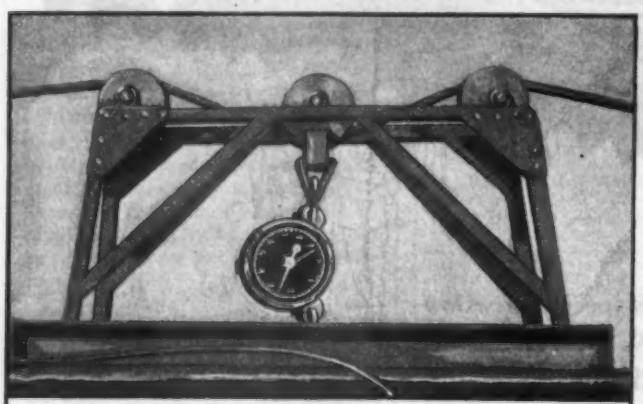
121 So. Grand Ave. Baldwin, L. I., N. Y.



MEASURING TENSION IN A MOVING CABLE WITH A DILLON DYNAMOMETER

Moving wire, rope or nylon strand passing over pulley arrangement shown above registers exact tension, *in pounds*, on accurate DILLON Dynamometer. Just one of *hundreds* of valuable uses for this precision instrument. Nine different capacities from 0-500 lbs. up to 0-20,000 lbs. yet all the *same* size, *same* weight. Equipped with maximum hand. Not injured by overload. Measure 8¼ in. x 6¼ in. x 3 in. Weigh only 8 lbs. 4 oz. *Low* in cost!

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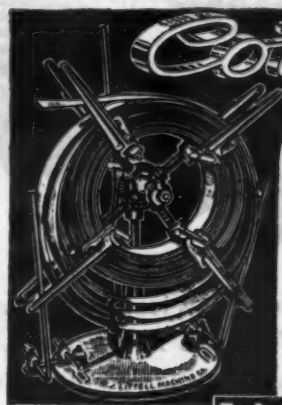


Coil Stock
feed it faster with LITTELL AUTOMATIC CENTERING REELS

WAR production is rolling along faster where roll stock is uncoiled with LITTELL Automatic Centering Reels. They insure a free-flowing loop of material. Coil capacities up to 20,000 lbs.

Littell also makes a complete line of other press-room equipment—Roll, Dial, Magazine and Hopper Feeds—Straightening Machines, Air Blast Valves, Pres-Vac Safety Feeders, etc. What are your requirements?

ASK FOR BULLETINS

Littell No. 3 Reel. Capacity 300 lbs.

F. J. LITTELL MACHINE CO.
4169 RAVENSWOOD AVE. CHICAGO ILL.

Model C

RANDALL and STICKNEY
Dial Gauges and Indicators

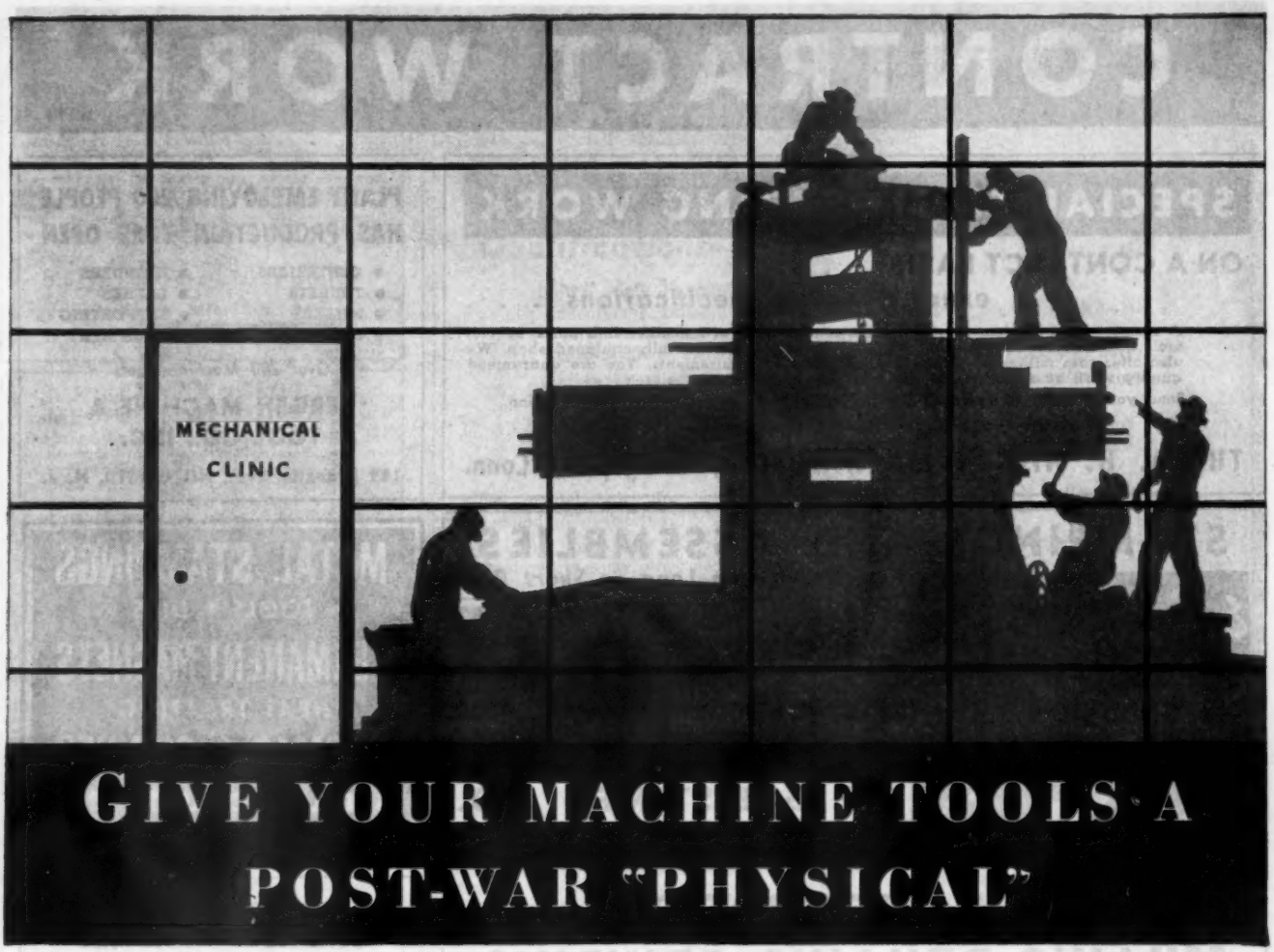
are accurate, reliable and built to stand the gaff of hard usage.

This Model C Dial Indicator has a 2½ in. diameter dial, with 50 or 100 divisions. Can be furnished in graduations of .001-in., .005 in. or .01 mm. Has a ½-in. range, movable dial easily set at zero.

The cases on all R. & S. Gauges are made from sturdy castings. The case and plate are two separate units, so that repairs can be made easily.

There is a R. & S. Gauge for practically every purpose. Write for circulars describing our complete line.

RANDALL & STICKNEY
Waltham 54, Mass., U. S. A.
Makers of Dial Gauges Since 1885



GIVE YOUR MACHINE TOOLS A POST-WAR "PHYSICAL"

Whatever your reconversion plans, the successful transition to consumer goods production depends largely on how well your *present* machine tools will measure-up to their post-war job.

That's why many leading manufacturers are losing no time in taking a physical inventory of their basic equipment, estimating how the strain of war production has impaired their efficiency and charting a systematic program of *Engineered Rebuilding* by Simmons.

For Simmons' specialized techniques go beyond conventional repair methods. Worn tools are not only restored to maximum efficiency but new utility often "built in" beyond the originally designed capacity.

Your maintenance engineers or works managers will find working with Simmons' engineers helpful in determining what improvements are required—hydraulic drive, conversion to motor drive, lengthening of beds or tables, widening of housings, raising of rails or heads, new type surface finishes or labor saving devices.

Simmons' extensive manufacturing facilities are adapted to rebuilding any type or size of machine tool. Typical assignments include the heaviest car wheel lathes, boring mills and planers for leading railroad shops...machine tools of every type and size for steel mills, automotive plants, shipyards and aircraft factories.

Add Engineered Rebuilding to your reconversion time table. Start today by sending us a list of your requirements. We'll show you how "The Simmons Way" can help you set-up that new production line...quickly!

President

SIMMONS MACHINE TOOL CORPORATION
1759 NORTH BROADWAY, ALBANY 1, NEW YORK

SIMMONS *Engineered* REBUILDING

CONTRACT WORK

SPECIAL ENGINEERING WORK

ON A CONTRACT BASIS . . .

exactly to your specifications . . .

A complete and efficient service for the manufacture of machines and parts, special tools and fixtures, etc., is available to you in our modern, fully-equipped shop. We also offer cam milling facilities that will fit your requirements. You are guaranteed quality work at a reasonable cost.

Send your blueprints or samples today for prompt quotations at no obligation.

Designers and builders of wire and ribbon stock forming machines.

THE A. H. NILSON MACHINE CO., Bridgeport, Conn.

PLANT EMPLOYING 200 PEOPLE HAS PRODUCTION TIME OPEN

- CENTERLESS
- TURRETS
- MILLERS
- SHAPERS
- GRINDERS
- LATHES
- SUPPORTING EQUIPMENT

Over 200 Machine Tools

BERGEN MACHINE & TOOL CO., INC.

189 Franklin Ave., NUTLEY 10, N. J.

STAMPINGS AND ASSEMBLIES

Fast Service on Long or Short Runs

"GREATER SAVINGS WITH GREIST"

We can handle your stamping and assembly requirements in any metal. Our modern equipment and methods coupled with 50 years of experience is your guarantee of accuracy and efficiency. Our facilities include capacity for handling screw machine products, tools, dies, jigs and fixtures.

Quality work by skilled mechanics is assured. Send your blueprints or samples today for prompt quotations!

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METAL STAMPINGS

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PERMANENT MAGNETS

HEAT TREATING

THOMAS & SKINNER STEEL PRODUCTS CO.

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HIGH-PRODUCTION MILLING-DRILLING-GRINDING

24 hr. service on

TOOL AND CUTTER GRINDING

DUDLEY F. FASOLDT & SON

PROSPECT HEIGHTS RENSSELAER, NEW YORK

• TOOL DESIGNING AND BUILDING • MACHINES DESIGNED • IDEAS DEVELOPED • PROMPT—EFFICIENT—SERVICE • • REASONABLE CHARGES •

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Write — Phone or Telegraph

MACHINE SHOP WANTS DEFENSE WORK

Lathes, Milling Machines, Drill Presses, Riveting, Hot Dip Tinning, Jigs and Fixtures. Investigate TODAY.

STEPHEN J. LEWIS ENGINEERING CO.
215 Butler St. TRiangle 5-5348 Brooklyn, N. Y.

PRECISION FORM GRINDING

Specialists in grinding Circular and Flat FORM-TOOLS, FORM Counterbores, FORM Flat-Drills, and related types of FORM grinding. Also step-grinding of Tungsten and Molybdenum Rods.

Send Prints for Quotation and Delivery

J. & S. TOOL CO.—477 Main St.—E. Orange 1, N. J.
(Makers of J.&S. Radil & Angle Dressing Tools)

MACHINE SHOP WANTS DEFENSE WORK

SCREW MACHINE, LATHE, MILLING MACHINE, POWER PRESS, JIGS AND FIXTURES

FREEPORT MACHINE WORKS, INC.
124 East Sunrise Highway, Freeport, N. Y.
New York Office
16 East 52nd Street, New York 22, N. Y.

REBUILDING

(Additional Rebuilding on page 291)

LET US REBUILD AND MODERNIZE YOUR MACHINE TOOLS

Our Methods of Rebuilding are similar to the Methods used by Manufacturers of New Machine Tools. Each Machine is Disassembled—Castings—Replaned — Hand-scraped — Spindles Reground and Bearings Refitted. All Worn-out Parts Replaced — including gears — Re-Lined and Machines Run in and Tested under Load.

We therefore are in a position to guarantee accuracy for our Rebuilt Machines to be Similar to new Machines.

We will design and build your Jigs and Fixtures.

VOLYN MACHINE TOOL WORKS, Inc.
149 BROADWAY, NEW YORK 6, NEW YORK

WIRE AND METAL SPECIALISTS

in round, flat, square and special shaped wire in all metals.

LARGE PRODUCTION CAPACITY

Plating and finishing.

EASTERN TOOL & MFG. CO.
BLOOMFIELD, N. J.

PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us — we will take care of them.

GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

WANTED

PRODUCTION MANAGER

To take complete charge of production planning and control in plant producing wide variety of small complete assemblies of precision-machined parts. The company is located in Milwaukee, Wis., employs 500 persons, is nationally known, highly rated, well managed and has an established post-war business. In writing give us the names of last three employers, dates of employment, description of position held, salary received, education, age and other important facts. This information will be held strictly confidential. Only letters giving full information requested will be considered.

P-962, AMERICAN MACHINIST
520 North Michigan Ave.
Chicago 11, Ill.

EXPERIENCED MECHANICAL ENGINEER

Engineer wanted with wide experience in designing and developing medium to heavy machinery. To be considered applicants must have had wide experience in Engineering and Development work and must be competent to direct and supervise all details.
An exceptional opportunity to become connected with a highly successful firm, up-to-date methods, and located in middle west, with good home and surroundings. For consideration, state in detail past experience, education, age, and salary desired. Interview will be arranged; all correspondence will be considered strictly confidential.

P-965. AMERICAN MACHINIST
520 N. MICHIGAN AVE., CHICAGO 11, ILL.

WANTED

MACHINE DESIGNERS

Experienced on the design of special machinery. Excellent opportunity for first class men interested in steady positions in New England.

Only men 35-55 with a record of successful achievements will be considered. In replying furnish information preliminary to a conveniently arranged interview.

P-940, AMERICAN MACHINIST
330 West 42nd St., New York 18, N. Y.

WANTED

Progressive concern in Ohio seeking an engineer thoroughly experienced in designing small electrical household appliances. State age, education, experience and salary expected.

Our organization knows of this advertisement.

P-964, AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

POSITIONS VACANT

MANUFACTURER OF centrifugal pumps and steam turbines has position available for man experienced in this line to assist in the supervision of machine shop. Requirements are thorough knowledge of machine shop practices and ability to eventually assume entire shop supervision. This is an old established business with good working conditions under young and progressive owner management. Now planning for after war business. Give details of qualifications and state starting salary desired. Dean Hill Pump Co., 4000 E. 16th St., Indianapolis 7, Indiana.

ENGINEERS, MECHANICAL draftsmen and detailers. Midwest manufacturer desires several engineers, mechanical draftsmen and detailers with heavy or excavating machinery experience for design and detail work leading to permanent engineering positions with responsibilities. Excellent post-war opportunity. WMC rules apply. P-955, American Machinist, 520 N. Michigan Ave., Chicago 11, Ill.

MECHANICAL ENGINEER—Old established company now converted to pre-war production (Essential Products) has openings for mechanical engineer with some machine design factory layout, and installation experience. Excellent future possibilities. Give complete details of personal qualifications and work history in letter of application. Address P-956, American Machinist, 330 W. 42nd St., New York 18, N. Y.

ASSISTANT SUPERINTENDENT
Manufacturing

Well established medium sized Chicago firm, for years a leader in design, manufacture and sale of products applied to electric power installation, offers an excellent opportunity for permanent employment.

Qualifications—

About 32 to 38 years of age.

Educational training equivalent to University course in Administrative-Mechanical Engineering.

Representative experience in Metal Trades Manufacturing work.

Ability to select, train and supervise all types of manufacturing employees.

Initiative, judgment, resourcefulness and tact in handling problems associated with the manufacture of diversified lines of products.

Our products are now being furnished to war activities and will be in greater demand in peace time.

It is not our intent to bring a person into our employ while he is an essential employee of some other necessary war industry.

All correspondence will be considered strictly confidential.

P-952, AMERICAN MACHINIST
520 North Michigan Ave. Chicago 11, Ill.

POSITIONS VACANT

PRODUCTION MANAGER. Wanted by old established company with highest rating, building high grade medium and heavy machinery. Plant is modern, policies progressive and products nationally recognized. Permanent position with unusual future and opportunity for advancement for the right man. Correspondence confidential. Address with full particulars. P-970, American Machinist, 330 W. 42nd St., New York 18, N. Y.

EXPERIENCED DESIGNER wanted for small tools such as die heads, etc. Good opportunity with old established company. Give full particulars as to experience and salary desired. Application will be treated confidentially. P-971, Amer. Mach., 330 W. 42 St., New York 18, N.Y.

TOOL DESIGNERS and draftsmen wanted by an old established company: Location, Central Ohio. Experienced in the designing of jigs and fixtures, also having wide experience in estimating the cost of manufacturing jigs, fixtures, special tools, special machinery and machining of parts for machine tools in addition to having had experience in routing and planning work going through factory. Give full particulars regarding your past experience, where you have been employed, length of time of employment, monthly salary desired and how soon would you be prepared to report for work. P-973, Amer. Mach., 520 N. Michigan Ave., Chicago 11.

EMPLOYMENT SERVICE

SALARIED POSITIONS—This advertising service of 34 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be indivdualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details. R. W. Bixby, Inc., 366 Delaware Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

EXPORT EXECUTIVE. Over twenty years experience in every phase of export in the U. S. and abroad. Excellent record of accomplishment, fluent in the principal commercial languages, widely traveled, thoroughly competent and reliable. PW-928, American Machinist, 330 W. 42nd St., New York 18, N. Y.

FACTORY EXECUTIVE, 46, with experience as factory manager, superintendent, chief production engineer and chief engineer on product development and design. Will consider position of major responsibility only. PW-959, American Machinist, 520 N. Michigan Ave., Chicago 11.

DESIGNER 46, 18 years tool designing. 12 years tool making, specializing acme and cone setups, supervision. Wishes new connection with post-war opportunities. PW-974, American Machinist, 330 W. 42nd St., New York 18, N. Y.

POLISHING & BUFFING EQUIPMENT SALES MANAGER

Well established midwest machinery builders want manager capable of assuming full responsibility for success of line of Automatic Polishing and Buffing Machinery. Must be familiar with all branches of finishing and preferably have engineering ability. Outline experience last ten years and give age. Confidential. Address

SW-968, AMERICAN MACHINIST
520 North Michigan Ave.
Chicago 11, Ill.

WANTED

SALES ENGINEER

Location — Ohio

Progressive engineering and tool manufacturing concern of twenty-five years standing is seeking a qualified tool designer who is, by virtue of experience, capable of heading up engineering sales, covering complete service in tool design, process engineering, production planning, plant lay-out, etc. We have an engineering organization of approximately sixty men and our manufacturing facilities are balanced in a manner to permit the handling of all types of work. This combination enables us to manufacture all tools and equipment which we design. If customer so desires. This is a first-class job for a high caliber man and offers unlimited post-war possibilities. Straight salary, or salary and commission. Give complete chronological record and all pertinent facts in your letter.

SW-932, AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

SALES ENGINEER

Machine tools; 35 to 50; familiar N. Y. territory. Must have initiative, judgment, and good sales record. To sell and manage office. Well established, old line. Salary and commission according to ability and results.

SW-967, AMERICAN MACHINIST
520 North Michigan Ave., Chicago 11, Ill.

POSITION WANTED

EXECUTIVE 35 years experience—qualified to supervise tool design. Tool room and production as superintendent or assistant to chief executive. First class organizer and systemizer, 12 years with present employer. Desire permanent connection, in a smaller city. Address—A. R. E., 5544 Underwood, Detroit 4, Mich.

(Additional Employment & Business Opportunity Advertising on page 294)

SEARCHLIGHT SECTION

(Continued from page 293)

SALESMEN WANTED

SALES ENGINEER—Nationally known power press manufacturer and allied equipment requires high grade sales engineer with broad experience in that field; will consider engineer without sales experience providing press and stamping experience broad enough to compensate; salary plus bonus; furnish complete record, education, experience, past earnings and references and recent non-returnable snapshot. Will not contact references until after interview. SW-972, American Machinist, 330 W. 42nd St., New York 18, N. Y.

PATENT ATTORNEY

PATENTS, COPYRIGHTS, Booklet, "General Information concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 453, 815-15th St., N.W. Washington 5, D.C.

EUROPEAN REPRESENTATION

By American machine tool specialist

with long and extensive experience and contacts abroad. Offers services to several manufacturers of non-competitive products. Investigation welcome.

RA 963 AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

Interested in Purchasing Production machine shop outside New York area with or without present management. Give full details.

BO-960, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N.Y.

WANTED

PRODUCTS OR INVENTIONS FOR POST-WAR MANUFACTURE

We will purchase outright or manufacture on a royalty basis, household, automotive, tools, or any specialty of recognized merit. We are a well organized and equipped metal working company. Write giving details of your product or item. Address

BO-953, AMERICAN MACHINIST
520 North Michigan Ave.
Chicago 11, Ill.

INVENTIONS OR PRODUCTS WANTED FOR POST WAR MANUFACTURE

Organization with complete Engineering Department, tool making, and manufacturing facilities. Modern plant, in position to develop, manufacture, advertise and sell. Royalty basis or any other satisfactory arrangement.

BO-966, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N.Y.

A GOOD IDEA

The Board of Directors were listening to the report of their New Business Division for Post War Development when their Vice-President broke in to say

"Gentlemen, what we want and must have is a product that is brand new, something that the industrial world has badly wanted, in every factory and office under the sun . . . ".

And we say: "That Vice-President

IS RIGHT"

We have however gone the "GOOD IDEA" one better, we have reduced it to an operating machine ready to demonstrate.

Corporations interested in obtaining manufacturing and selling rights can obtain information by writing—

BO-978, AMERICAN MACHINIST
330 West 42nd Street
NEW YORK 18, N. Y.

Large Gould & Eberhardt Rack Cutter For Sale A Rare Tool

Length of bed 13', Length of Table 8'. Direct motor driven. Cap. 2½" Pitch—5½" OD. Has 7 Rack Backings 7' Long. 4 Index Plates, 23 Feed Gears 20-120T, 8 Index Gears 20-48T. 49 Table Index Gears 21-75T, 153 Assorted High Speed Cutters. Machine guaranteed in excellent condition

For further details wire, phone or write

JOSEPH BEAL & CO.
465 Atlantic Ave. Boston, Mass.
Hancock 6460-6461

Machinery for Sale

Steam hammers 1000#, 800#, 500#, Bignall-Keeler 8" pipe threader, Cochran-Bly #2 circular saw and saw sharpener; back geared #3 and #4 Morse taper drill presses, Pratt & Whitney, #2 die sinker.

WANTED

4" upsetter, 150-200 ton trimming press

Merchandise for Sale

Surplus shackles from ½" to 2½", boom chain 1", Liverpool and Seattle cargo hooks, 18" x 1¾" pipe turnbuckles, 18" diam, ¾" pipes 19' and 21' lengths.

Vince Forging & Manufacturing Co., Inc.
EASTON, PA.

WANTED — POST WAR PRODUCTS

A Denver manufacturing plant with adequate capital, production facilities, and sales force to market a large number of products, wishes to contact designers who have developed tools, hydraulic equipment, domestic heating units, automotive parts and accessories, household items, or electrical devices which will find a nation-wide market. Will contract on a royalty basis or purchase all patent rights.

PAUL WHITAKER **1325 Acoma, Denver, Colorado**

FOR SALE

Garvin 1½" Turret Chucking Lathe. Drawbar. 25 Collets. 6—2 and 3 Jaw Chucks. 7 Nose Pieces. Semi Automatic. Complete.

Garvin 2½" Turret. Hand Feed. Stock Barfeed. Master Collet. Complete.

Hendey Engine Lathe. Q.C. 6'x15"x38 Centers. 3 & 4 Jaw Chucks. Face Plate. Steady Rest.

P&W Engine Lathe 14'x27"x120" Centers. New Compound. Face Pl. 21" Scroll Chuck. Pl. Ch. Rebuilt by Experts. Excellent Condition.

Fox Chasing Bar Lathe. Tail Turret. Cross-slide. 24 Hobs. About 30 extra Tools. Several Hollow Mills. Cuts. Right. Left. Inside. Outside. Threads.

Cincinnati No. 2 Universal Mill. Vertical Head. Good.

Nut Tapper, Treadle Type. 4 Spindle. Cutting done in oil bath. Slot Feed.

Round Bar Straightener. ⅜. Like wire straightener. Takes Kinks from Rounds.

JAY SALTER
534 S. Goodman St., Rochester, N. Y.

IF YOU ARE DOING DEFENSE WORK

Send for Our Latest Circular Covering Bargains in Small Tools Such as Drills, Reamers, Turret Attachments, etc.

DEWITT TOOL COMPANY
173 Grand St. **New York City**

FOR SALE

Coulter Diamond Boring Machine

Vertical, single spindle, complete with 5 HP, 440 volt, 3 phase drive with starter and work hold down—can finish bore holes up to 4" dia. by 3" deep. Machine ready to run.

THE OHIO ELECTRIC MFG. COMPANY
CLEVELAND, OHIO

WANTED

Swiss Type Automatic or Brown & Sharpe 2G in good condition. Write to

Maclen Automatic Product Co.
425 QUEEN AVE., NO. **MPLS. 5, MINN.**

WANTED ROLL FORMING machine, 8 to 10 1½" diameter double spindles, with water pump, straightening head, and automatic cut-off. Must be in good condition.

STRAITS TOOL & MACHINE CO.
10800 E. OUTER DRIVE, DETROIT 24, MICH.

WANTED 10 PUNCH PRESSES. 35 to 100 ton, OBI, geared or belt driven. Must be in good condition.

Straits Tool & Machine Company
10800 E. Outer Drive **Detroit 24, Mich.**

"FALK" for DEPENDABILITY in Rebuilt Machinery

OUR INVESTMENT IS YOUR SECURITY

"FALK" STOCK — A modern stock, with every item owned by "FALK" and in our warehouse or enroute. Shipments can be scheduled because "FALK" owns the machines. "FALK" critical inspection is given to every stock item. —Your inspection is welcome under ideal conditions for selecting machine tools.

"FALK" FACILITIES — Modern facilities to operate, rebuild and inspect used machine tools are provided to assure successful operation. Experienced personnel under supervisors with years of experience in our organization.

GOOD BUYS FOR THE MODERN SHOP* — IMMEDIATE DELIVERY

SHEARS

L & A 10' x 3/16".
#672 Niagara, 72" x 10 ga.

PRESSES

#4 Bliss D.C. B.G. Forging 4" stroke.
#4½ Bliss D.C. B.G. Forging 4" stroke (2).
#4½ Bliss 3 column B.G. 3" stroke
#5 Bliss D.C. B.G. Forging 3" stroke.
#74½ Bliss S.S. geared, 2" stroke.

BORING MILLS

100" Niles-Bement-Pond Bor. & Turn. Mill.
Vertical, 48" Gisholt.
Hill 4" Bar Horizontal Table Type.
Horiz. #36 Landis-Rochester, 3½ Bar Floor Type—Floor Plate 72" x 120".

DRILLING MACHINES

Weigel 22" B.G., Sl. Hd., tapping, P.F.
Superior 26" B.G., Sl. Hd., tapping, P.F.
Avey, 2 & 3 spindle Prentice, 4 spindle.
Henry & Wright, 6 spindle.
Leland Gifford 2 spindle.
Woodward & Rogers 6 spindle.

RADIAL DRILLS

5' Arm 11" Rd. Col. Cincinnati Bickford.
5' Arm 13" Rd. Col. Cinn. Bick. air clamp.
7' Arm 13" Col. Cincinnati Bickford
4' Arm 11" Col. Cincinnati Bickford

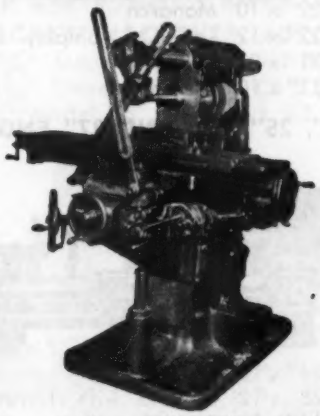
MULTIPLE DRILLS

Fox #15H 54 spindle hydraulic feed.
Fox #D-31 24 spindle motor drive.
Natco #D-5 8 spindle #1 M.T.

GRINDERS

16" Heald Rotary Surface Grinder.
#4 Brown & Sharpe Universal Grinder.
12" Heald Rotary Surface Grinder equip with 9" Dia. Perm. Mag. chuck.
#2 Cincinnati Centerless Grinder, Filmatic.
#12 Greenfield Internal Hydromatic Grinder, sizematic type, complete with Tank and Pump.
Oliver Model 51 Drill Grinder; 1½" cap.
Pratt & Whitney 14x36 model B vertical surface grinder.

MILLING MACHINES



#2 Brown & Sharpe Plain Milling Machine. Range—28 Longitudinal travel. 10" cross travel. 19" Vertical travel. Table working surface 10" x 45".
No. 5 Cincinnati, High Power, Plain, S.P.D.
No. 4 Cincinnati, High Power, Plain, S.P.D.
No. 3 Cincinnati, High Power, Vertical
No. 2 Brown & Sharpe, Vertical, SPD.
No. 0 Bickett Vertical Bench Miller
No. 2 Cincinnati, High Power, Plain.
No. 2 Cincinnati, Motorized, Pyramid Col.
No. 2 Brown & Sharpe, Plain (10).
No. 1½ Brown & Sharpe, Plain (2)
#1 Kempsmith Universal, Cone Drive.
No. 1½ Valley City Universal, Cone Dr.
No. 1 Brown & Sharpe, Plain (6).
No. 12 P & W Lincoln Type Production (2).
Ames Precision Universal Bench Mill.
P & W 2" Duplex Spline Miller.
Hall Planetary Thread Miller 24"
No. 8 Lees Bradner Thread Miller.

PLANERS

120"x72"x35' Betts, 4 Heads, M.D.*
72"x72"x18' Pond Heavy Pattern, 4 Heads.
48"x48"x12' Putnam Heavy, 2 Heads, M.D.
30"x30"x12' American M.D., 2 Heads.
30"x30"x10' Cinn. Heavy Pattern, 2 Hds.
20"x20"x36" Niles-Bement-Pond, Planer Shaper, M.D.

LATHES

South Bend 16" x 6' Motorized Gap Lathe
Putnam 26 x 12 Heavy QCG, arr. for M.D
American, 16 x 6 Q.C.G. Geared Head
Hendey, 16 x 10 Q.C.G., Turner M.D.
Potter & Johnston #6A Automatic Chuckers; 3½" dia. hole in spindle (2).

SHAPERS AND GEAR CUTTERS

24" American, M.D.
16" Queen City, M.D.
7" Rhodes Horiz. High Speed, Belt Dr.
26" Cincinnati Triple Geared Belt Dr.
#612 Fellows 36" Gear Shapers, (2)
12" Schuchart & Schutte Gear Hobber.

BENDING ROLLS

Bertsch 3" x 3" x ⅜" angle bending roll.
Niagara pinch type 7' x 7" roll motor driven.

MISCELLANEOUS

Lakewood High Lift Truck, platform type, 4000# capacity, less batteries.
J. C. Miller Co. Lacq. Heater with acquistat.
Heat Treating Furnaces for the tool room, all sizes.
Sleeper & Hartley #1 Wire coiling machine for making BX cable.
50 K.W. Moesta Gun Welder Transformer, portable, 25 cy. 440 volts.
Grinding Wheels for #2 centerless 4" face 20" diameter.
Blake and Knowles 12x2x12 Simplex Type, Hydraulic Steam Pump, 2000 lbs. pressure with 80 to 125 lbs. steam, delivers 9 gallons per minute.
Niagara #98 Brake & Folder, 72" cap. 14 ga. arranged M.D.
#228C Greenlee Vertical Hollow Chisel Mortizer, Power feed, M.D.

HEADQUARTERS FOR POWER PRESSES

The above list, selected from our current stock, is subject to prior sale or subsequent additions. Hence we urge your prompt inquiries on any of these machine tools or others in which you are interested.

Buy from Stock

MACHINERY

Tel. Main 6347-6348

FALK

MACHINERY CO.,

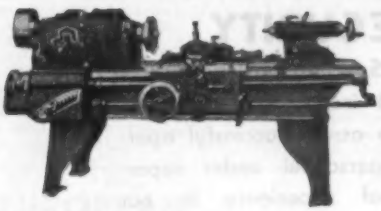
18 WARD ST.

MERCHANTS

ROCHESTER 5, N.Y.

EMERMAN OFFERS FROM STOCK

14" ENGINE LATHES



3—14" x 6' Hendey
1—14" x 5' Lodge & Shipley

16" ENGINE LATHES

3—16" x 6' Hendey
1—16" x 6' Lodge & Shipley
1—16" x 10' American
1—16" x 6' Pratt & Whitney
1—16" x 8' Hendey
1—16" x 8' Monarch

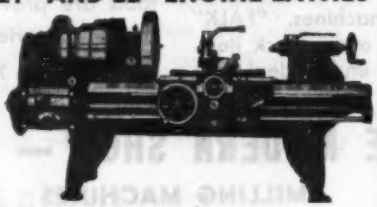
17" AND 18" ENGINE LATHES

2—18" x 12' Bradford G. H.
1—18" x 8' Hendey
1—18" x 10' LeBlond
1—18" x 8' American
1—18" x 10' Lodge & Shipley

19" AND 20" ENGINE LATHES

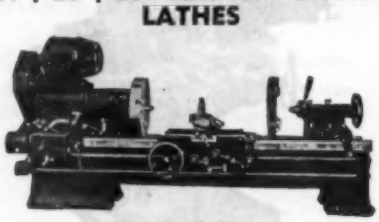
1—20" x 10' Springfield
1—20" x 8' American
1—20" x 8' Hendey
1—20" x 8' Monarch
1—20" x 8' American
1—20" x 8' Hendey
2—20" x 10' American
1—20" x 12' Hendey
1—20" x 12' American
1—20" x 12' Monarch
1—20" x 8' Hendey Engine
1—20" x 10' Sidney
1—20" x 10' Prentice G. H.

21" AND 22" ENGINE LATHES



1—22" x 10' Monarch
1—22" x 12' Lodge & Shipley Cone
1—21" x 8' LeBlond
2—21" x 10' LeBlond

24", 25", 26" AND 27" ENGINE LATHES

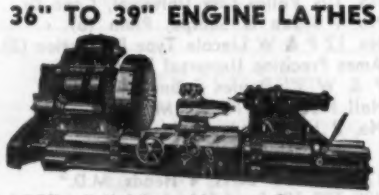


1—24" x 12' Springfield
1—25" x 12' LeBlond with Turret
1—26" x 9' Bridgeford
1—26" x 10' Bridgeford
1—26" x 12' Bridgeford Cone
1—27" x 18' American

30" TO 35" ENGINE LATHES

1—32" x 13' Pond Cone
1—32" x 16' Schumacher & Boye
1—32" x 14' Bridgeford
1—32" x 16' Bridgeford Heavy Duty
1—30" x 15' American

36" TO 39" ENGINE LATHES

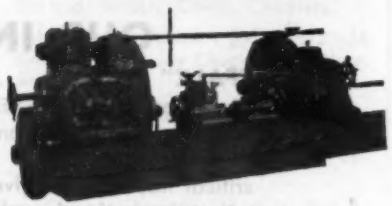


1—38" x 14' New Haven Cone
2—36" x 18' Lodge & Shipley
1—36" x 18' LeBlond
1—36" x 18' Niles-Bement-Pond

40" AND LARGER ENGINE LATHES

1—62" x 34' Pond
1—42" x 30' Niles

WHEEL LATHES



1—90" Putnam Wheel Lathe

CRANKSHAFT LATHES

2—26" x 10' LeBlond Universal
4—5AC LeBlond
2—30" x 10' Wickes
1—30" Wickes Universal
1—4AC LeBlond
1—Sundstrand C.D. 15 x 56

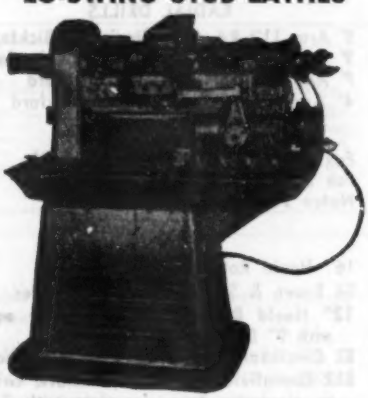
17" TO 21" PLAIN TURNING LATHES

1—17" x 10' LeBlond
1—20" x 10' LeBlond
1—20" x 7'6" Wickes

SUNDSTRAND STUB LATHES

1—8" Special

LO-SWING STUB LATHES



1—"IMP"
2—3½" x 36"
3—3½" x 60"
2—8" x 84"
1—8" x 108"

AUTOMATIC LATHES

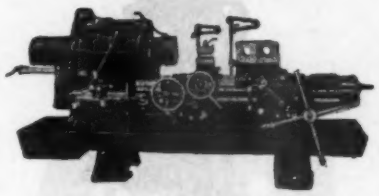
3—14" x 19" Fay Automatic

EMERMAN MACHINERY CORP.

875 W. 120TH STREET **CHICAGO 43, ILLINOIS**

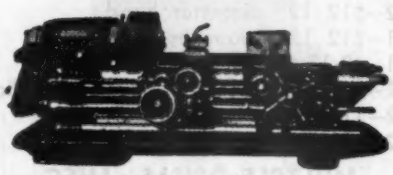
EMERMAN OFFERS FROM STOCK

FOSTER TURRET LATHES (SADDLE TYPE)



1—#2B Foster Universal Turret Lathe

GISHOLT TURRET LATHES (SADDLE TYPE)

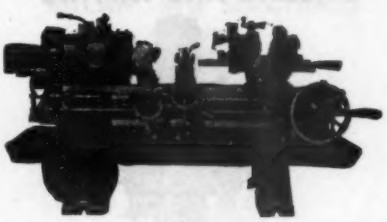


3—21" Gisholt
2—#3L Gisholt
2—24" Gisholt Universal
2—2L Gisholt

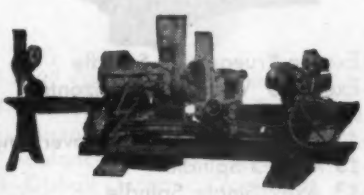
LIBBY TURRET LATHES

1—21" Libby
1—18" Libby—Model A

WARNER & SWASEY TURRET LATHES (SADDLE TYPE)



4—#1-A W. & S. Univ. Hollow Hex.
5—#2-A W. & S. Univ. Hollow Hex.
1—#4-A W. & S. Univ. Hollow Hex.
2—#3-A W. & S. Univ. Hollow Hex.



WARNER & SWASEY TURRET LATHES (RAM TYPE)

4—#4 W. & S. Universal
1—#6 W. & S. Universal

MISC. TURRET LATHES

1—#2 Acme Full Universal Turret
1—2 spindle J & L Flat Turret G.H.
1—6A Potter & Johnson Automatic

MISCELLANEOUS LATHES

2—Steinlee 24" Turret
1—30' Pit Lathe Face Plate 156"
1—26" Davis Pulley Lathe

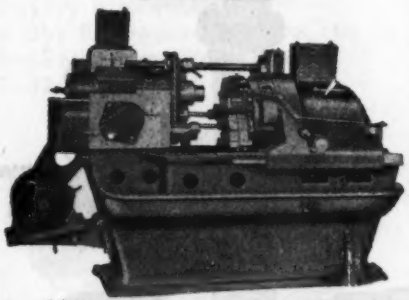
BORING LATHE

1—48" x 58' Bridgeford Boring Lathe

SCREW MACHINES, AUTO

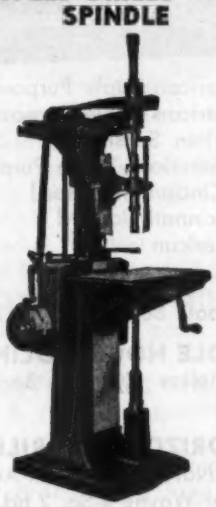
2—2¼" Model "B" Cleveland S.S.
1—1¼" Cleveland Model "C" S.S.
1—2" Model "B" Cleveland S.S.

CHUCKERS



1—8½" x 8" Goss & DeLeeuw 4 Spindle

HIGH SPEED DRILLS — SINGLE SPINDLE



1—Allen 7" Overhang
1—Model DA Demco
1—#2 Avey 7½" Overhang
3—#2 Edlund Krueger Head 2 Spindle
3—16" Allen
1—16" Pierle
1—#1 Avey 7½" Overhang
1—#2 Edlund 9" Overhang
1—Sipp 8" Overhang
1—#4B Edlund 12" Overhang
1—Leland-Gifford 7" Overhang
1—Edlund 8" Overhang
1—13" Fosdick
1—#3 Avey-Matic 12" Overhang
1—#2 Fosdick 6½" Overhang
2—Leland-Gifford 6" Overhang
1—2B Edlund 12" Overhang
1—Canedy-Otto 7½" Overhang
1—#1½ Avey 7½" Overhang
1—Detroit 8" Overhang Sliding Head
1—#2B Edlund
1—Avey 15"
1—Henry & Wright 8" Overhang
2—Allen 14"
1—Allen 16"

1—#2 Leland-Gifford
1—12" Leland-Gifford
1—1B Edlund
1—14" Leland-Gifford Drill

COLBURN HEAVY DUTY DRILLS

3—#14 Colburn Heavy Duty
1—#2 Colburn 2 spindle
1—#2 Colburn 4 spindle
1—#4 Colburn 2 spindle

EMERMAN MACHINERY CORP.

875 W. 120TH STREET — **CHICAGO 43, ILLINOIS**

EMERMAN OFFERS FROM STOCK

HIGH SPEED DRILLS — 2 SP.

1—Sipp 2 spindle 8" overhang
1—No. 1/2 Avey 5 1/2" overhang
1—#2 Taylor & Fenn 8" overhang
1—#42 Taylor & Fenn 8" overhang
1—Canedy-Otto 7 1/2" overhang
1—Leland-Gifford 6 1/2" & 7" overhang
1—#2B Edlund 8" overhang
1—Fosdick 6 1/2" overhang
1—Leland-Gifford 6" overhang

1—#3 Avey & Tapper
1—#2B Edlund
1—Henry & Wright 16"
1—16" Fosdick
5—#2B—2 Spindle Edlund
1—16"—2 Spindle Allen
2—#2 Avey—2 Spindle

3 OR MORE SPINDLES

1—Demco 3 spindle 7" overhang
1—Demco 8" overhang
1—Henry & Wright 7" overhang
1—14" Dwight-Slate
1—16" Gordon
1—#3 Avey-Matic
1—16" Sipp
1—2-B Edlund
1—13" Fosdick
1—#1B Edlund 4 spindle
1—Barr 4 spindle 16"
1—#2 Avey-Matic—4 spindle
2—#3 Avey—4 spindle
1—14" Allen—4 spindle
2—#2 Allen—4 spindle
1—20" Leland-Gifford—4 spindle
1—#2B Edlund—4 spindle

BAKER HEAVY DUTY DRILLS

4—#217 Baker
2—#220 Baker—2 Spindle Prod. Drill
1—#413 Baker Heavy Duty

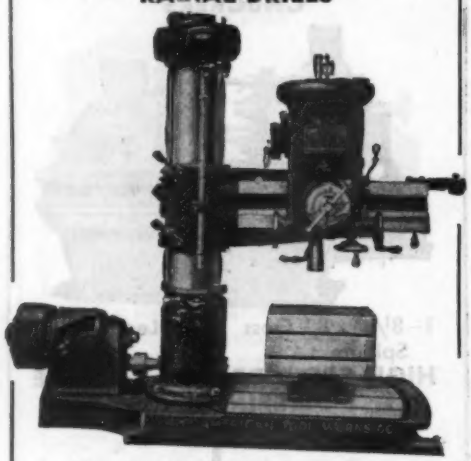
BARNES HEAVY DUTY DRILLS

1—#930 Barnes Hydraulic Prod.
5—#920 Barnes Production Drill

UPRIGHT DRILLS

1—42" Barnes, Sliding Head
1—40" Aurora
1—32" Cincinnati
2—24" Cincinnati Bickford

RADIAL DRILLS



2—8' American Triple Purpose
6—4' American Triple Purpose Radial
1—3' Carlton Sensitive
1—3 1/2' American Triple Purpose
1—3 1/2' Cincinnati-Bickford
3—3' Cincinnati-Bickford
1—3' American

RAIL DRILLS

1—#17 Foote Burt 4 Spindle Rail Drill

HOLE HOGS MOLINE

1—7-D Moline Cylinder Boring 2 spindle

HORIZONTAL DRILLS

1—6-Sp. Nat'l Acme Semi-Auto. 1/4"
1—Krueger-Wayne 4-Sp. 2 hd. hyd.
1—#1/2 Avey 2-sp. opposed
1—Natco 2-way
2—Ingersoll S.E. 2-sp. Horiz. Hydr. Drill with rotary indexing table.
1—Rockford 5-spindle

NATCO MULTIPLE DRILLS

2—#12 12" diameter head
1—#12 12" Diameter
1—#B-12-C 14" x 26" head
1—#C-12-H 19" x 28" head hydraulic
2—#11 12" diameter head
2—#30 Natco

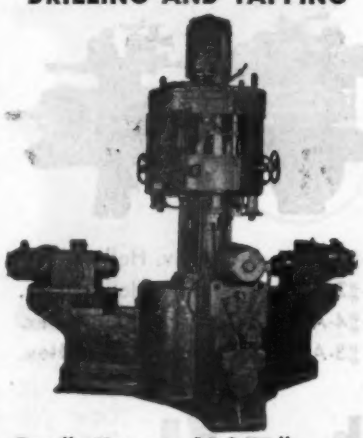
MULTPLE DRILLS—MISC.

1—#11 Pratt & Whitney 9 3/8" x 9 3/8"
1—#15 Fox & Tapper 14" x 18" hd.
1—Fox Hyd. Rot. Table 18" hd. 22AC
1—#01 Baush
1—#22AC Fox
1—Baush

MULTIPLE DRILLS STRAIGHT LINE

1—#11 Natco 16-spindle
1—Boley 9-Spindle & Tapper
1—Boley 10-Spindle
2—Boley 6-Spindle

DRILLING AND TAPPING



1—Excello-Krueger 15-Spindle
1—Excello-5 Vertical 3-Horizontal spindle
1—#3 Avey Head only 12" overhang
1—#3 Avey 2-Spindle
1—#3 Avey Single Spindle

EMERMAN MACHINERY CORP.

875 W. 120TH STREET — CHICAGO 43, ILLINOIS

EMERMAN OFFERS FROM STOCK

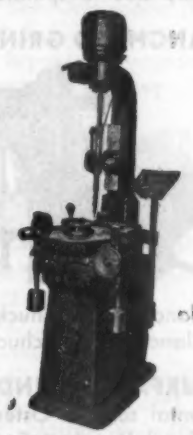
MISCELLANEOUS DRILLS

1—Bradford 2 head opposed vertical
1—#215 Barnes Hyd. Drill (Spec.)
1—Rehnberg & Jacobson Special Drill
1—Moline 3-spindle Piston Drill
1—Bradford 3-head
1—2 head Bradford Drill semi-auto.
1—Ashton-Russell Drill & Ream. 4 hd.
1—24" Leland-Gifford, Vert. Deep Hole

TAPPERS

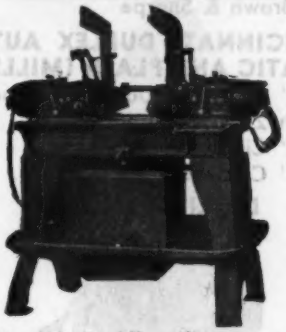
1—Natco 3-way Lead Screw Tapper
1—#5 Gaterman Double Spindle
1—C-4 Globe Tapper
1—C-6 Globe Tapper
2—Webster & Perks Tappers
4—Cincinnati Hi-Speed Automatic
1—Rickert & Shafer Radial

BALANCING MACHINES



2—18" Gisholt Static Balancer
4—Tinius Olsen Dynamic Balancers
1—Micro-Poise Static Balancer
1—Balancing Ways—Bowsher
3—Gisholt Dynamic Crankshaft

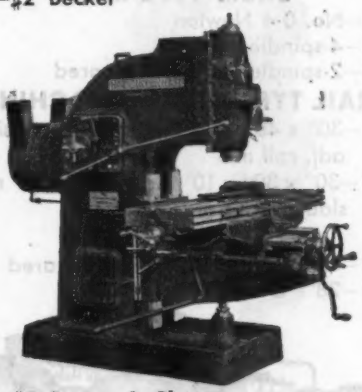
CENTERING MACHINES



1—4" x 48" Cadillac double end
1—4" x 60" Sundstrand double end

VERTICAL MILLS

1—#1M Cincinnati
2—#2 Cincinnati
3—#2½ B Milwaukee
1—2½ B Milwaukee Vertical Mill
1—#2 Milwaukee Vertical Mill
1—#2 Becker



3—#3 Brown & Sharpe
1—#3 Cincinnati
2—#3 Cincinnati Vertical Mill
1—#4 Kempsmith Maximill
2—#5 Becker
1—#6 Becker Vertical
1—Model B Becker Vertical B & C

HYDROMATIC MILLS

2—#45-48 Cincinnati plain hydromatic

AUTOMATIC MILLS

1—Pratt & Whitney 2-spindle automatic
1—30" x 22" x 4' Ingersoll semi-automatic reciprocating type mill

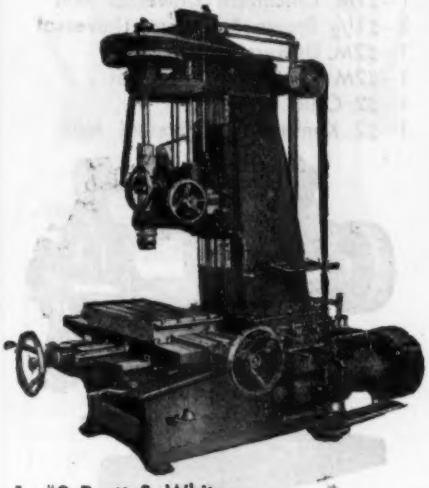
MANUFACTURING MILLS

1—#33 Kempsmith with Eklund head

DUPLEX AND SIMPLEX MILLS

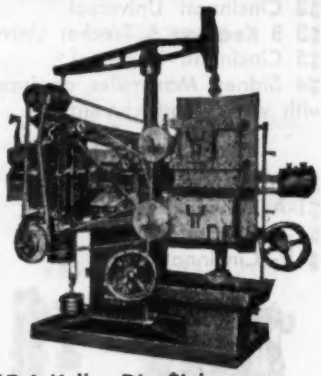
1—18" Ingersoll Duplex table 14" x 48"

JIG BORERS



1—#2 Pratt & Whitney

DIE SINKERS AND ENGRAVERS



3—#E-6 Keller Die Sinker
1—BG-724 Keller Die Sinker

HAND MILLS

1—#1 Kent-Owens
1—#0 Bristol
3—#6 Whitney

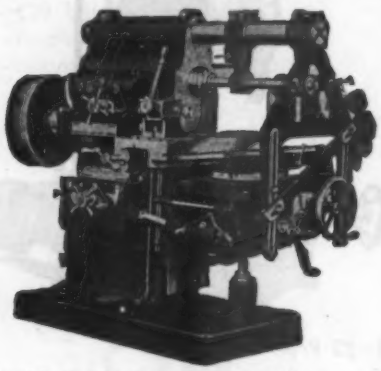
EMERMAN MACHINERY CORP.

875 W. 120TH STREET — CHICAGO 43, ILLINOIS

EMERMAN OFFERS FROM STOCK

UNIVERSAL MILLS

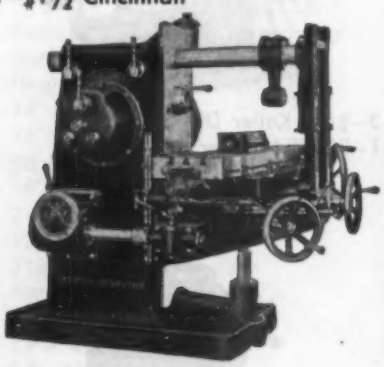
1—#1M Cincinnati Universal Mill
1—#1½ Brown & Sharpe Universal
1—#2M Universal—Cincinnati
1—#2M Cincinnati Universal
1—#2 Ohio Universal
1—#2 Kempsmith Universal Mill



1—#3 S Cincinnati Universal
1—#3 Cincinnati Universal
1—#3 B Kearney & Trecker Universal
1—#5 Cincinnati Universal
1—#4 Sidney Maximiller equipped with vertical attachment

PLAIN MILLS

1—#0 Y Brown & Sharpe Plain Mill
2—#1-A Milwaukee
1—#1-M Cincinnati
1—#1½ Cincinnati



1—#2 Ryerson-Conradson
1—#2 Cleveland Plain
2—#2-M Cincinnati Plain
2—#2 Cincinnati Plain
1—#2 Kempsmith
1—#2 Milwaukee Plain
1—3H LeBlond Plain Mill
1—#3 LeBlond Plain Mill vert. head
1—#3S Cincinnati Plain Mill
1—#4 Kempsmith Plain Maximill
5—#4 Cincinnati Plain Mill
1—#5 LeBlond Plain Mill
2—#5 Cincinnati
1—# Brown & Sharpe

CINCINNATI DUPLEX AUTOMATIC AND PLAIN (MILLS)

1—24" Cincinnati Duplex-equipped with 2 vertical spindles
1—48" Cincinnati Duplex
1—24" Cincinnati Plain

DEVLIEG MILLERS

1—#31 DeVlieg Supermill

DRUM TYPE MILLS

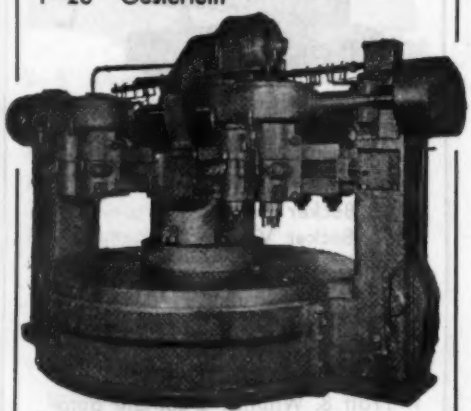
1—No. 0-4 Newton
1—4-spindle Newton
1—2-spindle Ingersoll Geared

RAIL TYPE MILLING MACHINES

1—30" x 48" x 96" Ingersoll Openside adj. rail mill
1—30" x 30" x 10' Ingersoll adj. rail slab milling machine

ROTARY MILLS

1—42" 2-spindle Ingersoll Geared
1—28" Oesterlein



1—Newton Mod. "V" 4
2 double spindle heads in front
2 double spindle heads in rear

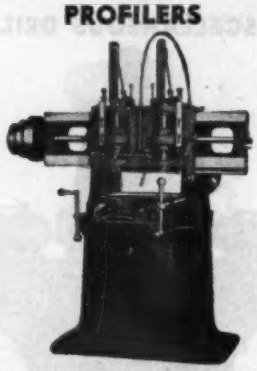
SPLINE MILLS

3—Bridgeport Auto. Dual Spline
1—Pratt & Whitney 4"

VALVE GRINDERS

1—12 spindle—Defiance

PROFILERS



1—#12 Pratt & Whitney 2-spindle
1—Leland-Gifford 2-spindle

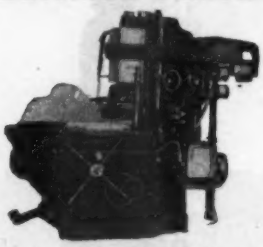
BUFFERS AND POLISHERS

1—#1 Gardner D. E. Polisher
1—½ H.P. Crown D.E. Polish Lathe
2—Type A Prod. Polish. & Finish

OPPOSED TYPE DISC GRINDERS

1—36" Discs—standard
1—#84—16" Gardner opposed
1—#6 Besly double spindle

BLANCHARD GRINDERS



1—#16 Blanchard 26" chuck floor M.D.
2—#16 Blanchard 26" chuck M.D.

SURFACE GRINDERS

1—Horizontal surface Osterholm
1—#78 Covel Hanchett Surface

TUB TYPE GRINDERS

1—Ingersoll 36"
2—Ingersoll 24"
1—#1 LeBlond Tool & Cutter Grinder

EMERMAN MACHINERY CORP.

875 W. 120TH STREET **CHICAGO 43, ILLINOIS**

EMERMAN OFFERS FROM STOCK

UNIVERSAL CYL. GRINDERS

1—#1 Brown & Sharpe
1—#4 Brown & Sharpe
1—#4 Landis Universal
3—#132 Arter Auto. Cylindrical
1—#13 Brown & Sharpe

BRYANT INTERNAL GRINDERS

1—No. 15
1—No. 6
2—No. 18
1—No. 6 Semi-Automatic
1—No. 6 Semi-Automatic (Hole)
2—No. 18 Semi-Automatic (Hole)
1—#10-A Bryant semi-automatic
1—#23 Baxter & Whitney

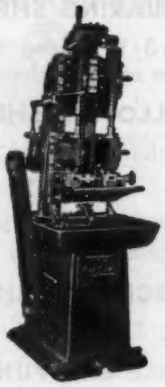
HEALD INTERNAL GRINDERS

1—#60
1—#72-A-3 Gage-Matic

PLAIN GRINDERS

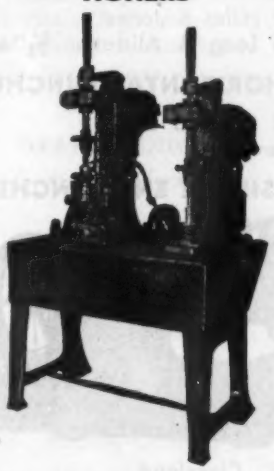
1—10" x 36" Landis, Camshaft
1—No. 132 Arter
1—10" x 24" Landis
1—#16 Brown & Sharpe
1—10" x 24" Norton Plain Grinder
1—#14 B & S (10" x 48")
1—6" x 32" Norton Plain Cyl. Grinder
1—6" x 18" Landis
1—16" x 32" AB-Hyd. Crank Landis
1—16" x 42" Hyd. Pin-Landis
1—14" x 48" Cincinnati

DIAMOND BORING MACHINES



3—Two spindle—Coulter

HONERS



2—Model MGAX D.S. Hutto
1—No. 214 8-spindle—Barnes
1—2-spindle—Hutto MGAX
1—No. 6 Barnes Horizontal
2—#306 H Barnes Vertical Hydraulic

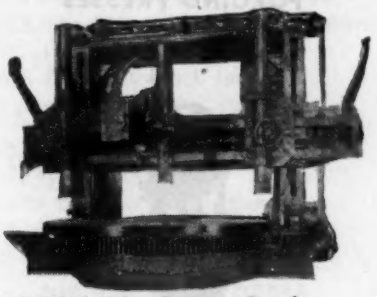
LAPPERS

6—1C Bethel Player Vert.
1—Ashton Russel D.E.
2—23F Bethel Player
1—Special—Krueger (Vertical)
1—8-Station—Schraner Crankshaft
1—1-F Vertical—Norton

HORIZONTAL FLOOR TYPE BORING MILLS

1—#2 P & H horiz. drill and borer
1—5" Dietrich & Hervey
1—#300 Giddings & Lewis 4¾"
1—3½" Rochester

VERTICAL BORING MILLS



1—16'-24' Niles Bement Pond
1—30" King Cone
1—30" Rogers S.P.D.
1—30" Warner & Swasey
2—24" Bullard "New Era"
1—51" Niles Bement Pond
2—72" Niles Bement Pond
1—10' Pond

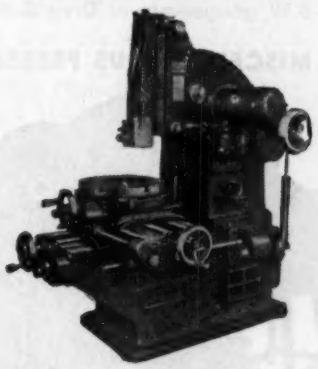
CAR WHEEL BORER

1—48" Bement Miles car wheel borer

SHAPERS

1—16" American
1—Niles R.R. 14"
1—24" Draw cut shaper Morton
1—40" Draw cut Morton
1—24" Draw cut Morton
1—24" Morton draw cut shaper
1—32" Cincinnati

VERTICAL SHAPERS



1—6" Model B Pratt & Whitney

SLOTTERS

1—10" New Haven
1—18" Niles slotter
1—18" New Haven slotter
1—26" Betts slotter
1—Newton 6" vertical
1—16" Bement Niles
1—15" Niles Bement Pond

EMERMAN MACHINERY CORP.

875 W. 120TH STREET — **CHICAGO 43, ILLINOIS**

EMERMAN OFFERS FROM STOCK

FORCING PRESSES

1—General Flexible, 4 post, 8 ton
1—#30 General Flexible 3 ton, post
1—8 ton General
1—#2 Brightman, 2" dia. cap.
1—Springfield, straightening
1—#33 General Flexible 3 ton
3—8 ton General Flexible Power Press

ARBOR PRESSES

1—#9 Greenerd

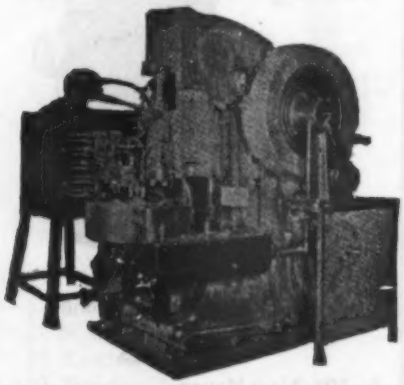
HYDRAULIC PRESSES

1—Elmes, upright, 2⅞" str. 3 ton
1—½ ton Fox, C type, 4" stroke
1—15 ton Gogan hydraulic press

BENDING BRAKES

1—6'12 gauge—power Dreis & Krump

MISCELLANEOUS PRESSES



1—#112 National Elec. Kobert Forging
2—#12 Sperry Filter Press, type 41
1—15 ton Eastern hydro-pneumatic
1—Leighton horiz. ¼" ram, ½" str.
1—#2050 King Pressure Toggle
1—#2050 King Pressure
1—Littel scrap cutter

SQUARING SHEAR

1—#4 (8' x 3/16") Long & Allstatter Gap type squaring shear

GUILLOTINE SHEARS

1—#4 Cleveland 3" round 2½" square

SHEARS

1—#445 Whitney Angle Iron Comb.
1—Kling Splitting, Rotary

PUNCH AND SHEAR

1—#2 Long & Allstatter, single end

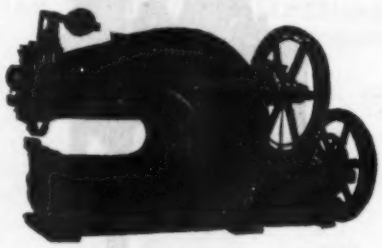
DOUBLE END PUNCHES

1—#2 Long & Allstatter
1—Camden 1" x 1"
1—Camden Horiz. and vert. 1" x 1"
1—#2 Hilles & Jones
1—#5 Long & Allstatter ⅝" x ⅝"

HORIZONTAL PUNCHES

1—#2 Hilles & Jones
1—Cleveland

SINGLE END PUNCHES



1—42" Cleveland
1—Style E Long & Allstatter 3½" x 2"
1—Reade 20" throat

FLANGERS

2—McCabe Flanger ½" x 6"
1—Yoder double end flanger

SEAMERS

1—#303 Toledo special seamer
2—#308 Toledo special seamer
1—#308H Toledo special seamer
1—7" x 43" quickwork
1—#10-A-1 quickwork 16 gauge
1—Magee vertical turning machine

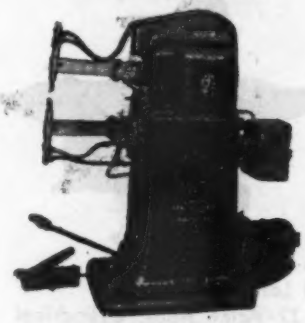
RIVET HEATERS

1—Style C Berwick, ⅜" cap.
1—#3 Berwick Bar Heater, Electric

PRODUCTION WELDERS (FOR REFRIG. CAB.)

3—50 KVA—114 Amps. Thomson-Gibb

ARC-WELDERS



1—100 Amp. Arc Elec. Lincoln
1—600 Amp. Arc Elec. Wilson

SPOT WELDERS

1—33 KVA port. Taylor-Winfield
1—12 VW A.E.F.
1—MD-12 A.E.F.
1—PD-16 Amer. Elec. Fusion

MISCELLANEOUS WELDERS

1—Multiple flash Thomson-Gibb

WIRE MACHINERY

1—¾" Wire Coiler
1—⅝" Wire Coiler
3—#88A Stem Wire Cutter and Shaper
1—Type CS-1 Wire Stripper & cutter

TUBE BENDING AND STRAIGHTENING MACHINES

2—No. 41 Bender Wallace
4—Artos type TC Auto Tube Straight

BULLDOZERS

1—#7 Blakeslee
1—#4 Ajax (vertical) 5" C.S.
1—#9 Ajax

FORGING ROLLS

1—No. 1A Ajax Taper

STRAIGHTENING ROLLS

1—No. 000 Hilles & Jones plate
1—Tishken strip straightener & cutoff
1—Corrugating roll
1—#2B Sutton roller leveler 60"
1—#110 Kane & Roach Coiler
1—36" Bertsch hand forming roll

THREAD CUTTERS

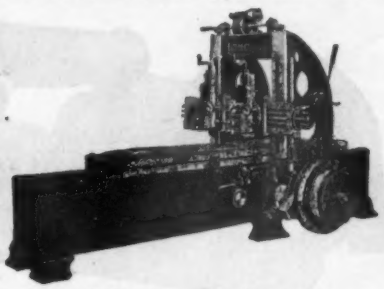
1—1" triple head bolt cutter (Acme)
2—¾" Geometric threader type 4
1—#1 Garvin screw slotter
1—¾" Rickert-Shafer-2 sp. thread
1—1½" Acme double head staybolt
1—#4 Stoever Bolt Threader
1—#5 Williams & White Threader & Cutter, 12"

EMERMAN MACHINERY CORP.

875 W. 120TH STREET **CHICAGO 43, ILLINOIS**

EMERMAN OFFERS FROM STOCK

DOUBLE HOUSING PLANERS



1—16" x 16" x 4' Hendey
1—20" x 20" x 4' Whitcomb
1—24" x 24" x 6' Lodge & Davis
1—36" x 36" x 14' Cincinnati
1—36" x 36" x 12' Niles
1—36" x 36" x 10' Niles
1—30" x 30" x 10' Bement
1—30" x 30" x 8' Cincinnati
1—42" x 36" x 12' Cincinnati
1—48" x 48" x 10' Niles Bement Pond
1—#1 30" Espen Lucas Rotary Planer

KEYSEATERS

1—Morton

GEAR HOBBERS

1—No. 12 Barber-Colman
2—8-Sp. Cleveland-Rotary Spline
1—#5A Lees Bradner

GEAR GENERATORS

1—15" Gleason Bevel finisher
1—15" Gleason
2—15" Gleason finisher
1—18" Gleason Bevel

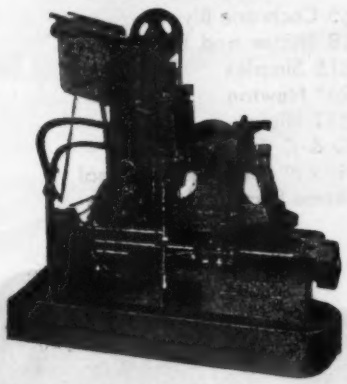
GEAR CUTTERS

1—No. 4-36 Brown & Sharpe S.P.D.
1—24" x 8" Gould & Eberhardt T & LP
1—No. 3-26" Brown & Sharpe S.P.D.
1—36" Gould & Eberhardt S.P.D.
1—5' G. & E.
2—Michigan #1128

GEAR SHAPERS

1—Maag 14" x 7"

GEAR ROUGHERS



1—36-ST-4 Sp. Gould & Eberhardt
1—15" Gleason Bevel Gear
2—15" Gleason Pinion
1—36-ST Gould & Eberhardt
1—36-BM Gould & Eberhardt Mult. Spindle Bevel Gear Rougher

GEAR GRINDERS

2—Pratt & Whitney Tooth

GEAR MACHINES, MISC.

1—Lipe Chamfering Machine
1—Lipe 2-spindle Chamfering Machine

THREAD MILLS

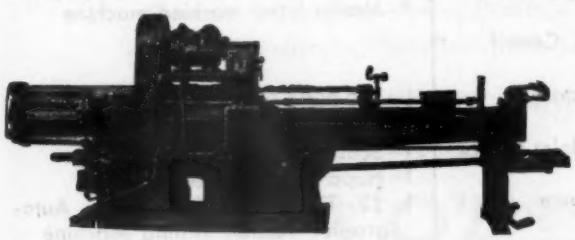
1—No. 27 Smalley-General

GEAR TESTER AND LAPPERS

1—Red Ring—National 7½" x 2"
1—Red Ring—National
1—15" Gleason Bevel Gear Tester
1—Red Ring—National Gear Lapper

GEAR TOOTH ROUNDERS

1—Ingle—20"
1—#40 Cross Hyd.
1—Cross Double Head



HORIZONTAL BROACHES

1—#3H La Pointe Hydraulic
1—#3 La Pointe Horizontal Duplex
1—#3 American Double Head

DOUBLE CRANK PRESSES

1—#3 Bliss 32" with cut-off attachment
1—#S-1 Ferracute
1—5A Bliss—with rack feed

STRAIGHT SIDE PRESSES

1—#203 Bliss 3" stroke
1—73½ Bliss Roll feed 1" stroke
2—#60 Bliss Rack & pinion
1—#74½ Bliss Roll feed
3—#56 Toledo

DIE SPOTTING PRESS

1—Newton die

SOLID BACK PRESSES

1—#32P Toledo 1½" stroke
1—#31 Toledo 1½" stroke
2—#75 Bliss 1¾" stroke 3⅞" C.S.
1—#4 Bliss 1½" stroke 3¼" C.S.
1—#3 Bliss 1½" stroke
1—#93½ Consolidated
1—#p-1 1½" stroke
1—#pG-1 3½" stroke
1—#pG-1 1" stroke

BENCH PRESS

1—#1 Baird 1½" stroke

WASHER PRESS

2—#1Southwark, solid back

HORNING PRESS

1—#43B Toledo Riveting 1½" str.

ROTARY BEVEL SHEARS

1—#3 Lennox Bevel Rotary, 1" cap.
1—¾" Marshalltown rotary bevel
1—¾" Lennox rotary bevel
1—30" Pettingell rotary 14 gauge
3—Quickwork #8A
1—#2 Lennox Bevel
1—#16A Niagara, 14 gauge

EMERMAN MACHINERY CORP.

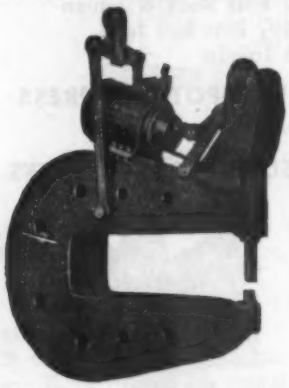
875 W. 120TH STREET **CHICAGO 43, ILLINOIS**

EMERMAN OFFERS FROM STOCK

RIVETING HAMMERS

1—#4A Rochester 1/4" to 7/16" capacity
3—#3A High Speed
5—#4A High Speed
1—#2A H.D. High Speed
1—#6B High Speed

PNEUMATIC RIVETERS



2—Allen (portable) 8" reach, 8 1/4" Gap 7/8" cap.
1—50 ton Hanna 102" reach, 15" Gap
1—20 ton Hanna 11" throat, 9" Gap
2—15 ton Hanna 9" reach, 8" Gap, 2" stroke, 1/2" cap.
1—15 ton Hanna 7/16" x 1/2"-6" throat, 6" Gap
1—20 ton Hanna 10" throat-8" Gap, 1/2" x 5/8" cap.
1—20 ton Hanna—floor type 6 1/2" throat, 10" Gap
1—15 ton Hanna—5/16" cap. cold
1—Hanna 8" throat, 7" gap, 5" stroke
1—30 ton Hanna riveting press, 1/16" drive
1—15 ton Hanna 4" throat, 10" gap, 7 1/2" cyl.
1—50 ton Hanna 96" throat, 27" gap
1—20 ton Hanna 6 1/2" throat, 10" gap
1—20 ton Hanna 10" throat, 12" gap, 12" cap. #1089
1—Allen, Pinchbug, 8" throat—8 1/2"
1—Allen, Alligator, 12 1/2" throat—9" gap—2 1/2" stroke
1—15 ton Hanna, 6" throat—6" gap—7/16" x 1/2" cap.
1—Chicago Pneu. Air Riveter
1—3 ton Hanna 2" throat—5" gap

STAKE RIVETERS

1—#1 Long & Allstatter Punch S.E.
1—Rock River 62" stake, 3/8" x 1/2"
1—#4 Long & Allstatter & Punch

COLD SAWS

1—#5 Cochrane Bly
1—#8 Nutter and Barnes
1—#15 Simplex
1—26" Newton
1—#11 Higley
1—Q & C Cold Saw
1—6" x 6" peerless universal
1—Acme Burring Hot Saw

UPSETTERS

1—6" Ajax upsetter
1—1 1/2" Ajax upsetter
1—1" Ajax upsetter
1—1" National
2—1 1/2" Acme
1—3" Acme
2—3 1/2" Acme
1—5" Ajax
1—5" Acme
2—2" Ajax
1—3" Ajax

HEADERS

1—1/4" Waterbury Farrell #11

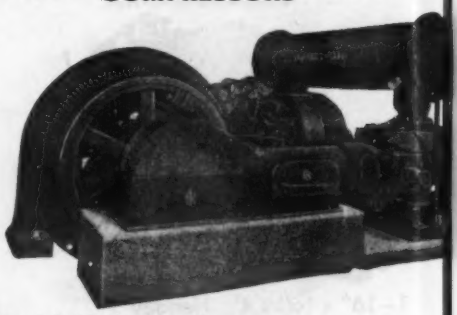
HAMMERS

1—800# double frame Fred B. Miles
1—1100# Chambersburg Steam
1—400# Drop Bliss
1—60# cushioned Bradley Helve
1—100# Bradley Helve
1—style B Blacker Power
1—No. 2 Pettingell Power

PUMPS

2—6" Outlet Centrif.
1—Gould 5" Outlet Centrif.
3—6" Gould Centrif.
1—Gould 400 gal. per min. Centrif.
1—#3 Union Centrif.
1—#8 Blackner 2 pumps Rotary
1—#140 Bowser Rotary
1—Gould 1 3/4" Outlet and Inlet Rotary
1—Devine Vacuum
1—14 x 9 x 18 Kinney Vacuum
2—Atwood Vacuum

COMPRESSORS

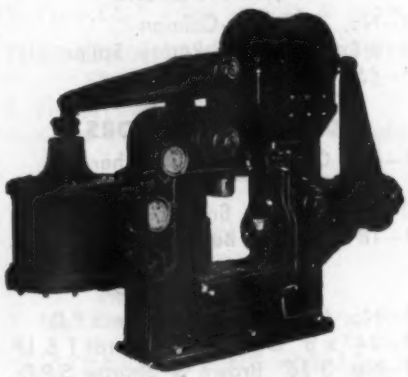


2—AA-12 Quincy New
1—A-8 Quincy
1—Chicago Pneumatic 1055 CFM 100#
1—Bury 546 CFM 100#
1—Ingersoll Rand 327 CFM 100#
1—Sullivan 788 CFM 100#
1—Ingersoll Rand gas engine 105 CFM
1—Brunswick-Kroeschell C02
1—2 1/2 x 2 1/2 Quincy Air compressor

EYE MACHINES

1—Gogan eye back machine
2—Type E United Shoe eyeletter

MISCELLANEOUS



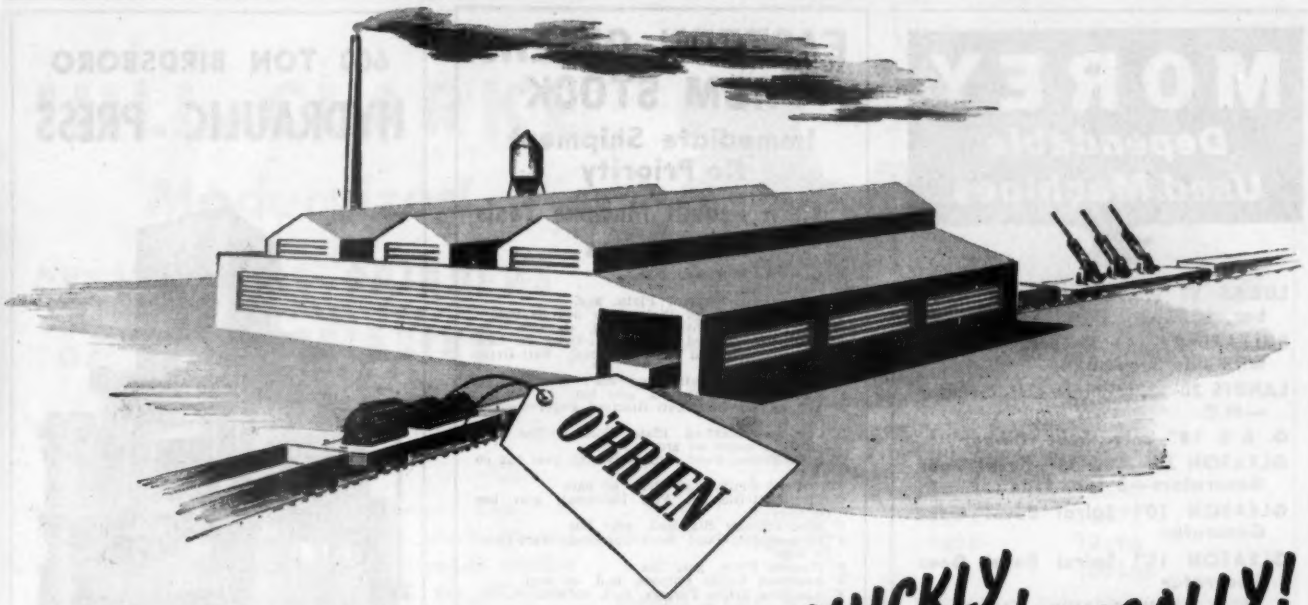
1—#1 Ryerson steel banding press
1—Gogan spring & bumper corrector
1—#508 sleeper & Hartley ring coiler
2—24 x 64 E.C. & M. lifting magnet
1—Brosius single line bucket
1—3 LH Magee wiring & edging mach.
1—Martin hand marking machine

TESTERS

1—100,000# Riehle Brake Beam Tester
1—Tinius Olsen Spring Tester
1—Scott cloth tester
1—Hupp Cam checker
1—#2 Tinius Olsen Auto. & Autographic Torsion Testing Machine

EMERMAN MACHINERY CORP.

875 W. 120TH STREET **CHICAGO 43, ILLINOIS**



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MOREY
Dependable Used Machines

LUCAS #1 Horiz. Boring Mill—3" bar, M.D.
BULLARD 24" Vert. Turret Lathe—with side head; R.P.
LANDIS 20"x220" Plain Cyl. Grinder—M.D.
G. & E. 18" Univ. Gear Hobber
GLEASON 3", 6" & 11" Bevel Gear Generators—2 tool type
GLEASON 10" Spiral Bevel Gear Generator
GLEASON 15" Spiral Bevel Gear Generator
K. & T. 3B Vert. Miller—Motor in Base
INGERSOLL 24" Cutter Grinder
INGERSOLL 26"x26"x12' Planer Type Miller
SAUNDERS 8-18" Pipe Threader
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GLEASON 12" Straight Bevel Gear Generator
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PRATT & WHITNEY 4½"x12" Thread Miller—Model C

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LYND FARQUHAR 26" Openside Crank Planer & Shaper
GISHOLT Precision Balancer
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ESPEN LUCAS #138 Cold Cutting Saw—Cap. of blade 12"
SLEEPER & HARTLEY Coil Winder
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4' Cincinnati-Bickford Plain, gear box on base
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4' Cincinnati-Bickford Plain, Vari-Drive on base
4' Niles-Bement-Pond Semi-Universal, Vari-Drive on base
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5' American Triple Geared, gear box
5' 17" column Cincinnati-Bickford Super-Service, m.d. on arm
5' Cincinnati-Bickford Plate Hole Driller, 220 volt D.C. motor on arm
5' Niles-Bement-Pond Full Universal, gear box on base
5' Prentice Plain, Vari-Drive on base
6' Cincinnati-Bickford Full Universal, gear box on base
6' Reed-Prentice Standard, gear box
6' Niles-Bement-Pond Semi-Universal, Vari-Drive on base
6' Western Plain, gear box
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9' American Triple Purpose, m.d. on arm

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24"x30' Schumacher-Boye, cone
26"x12' Schumacher-Boye, cone, motorized
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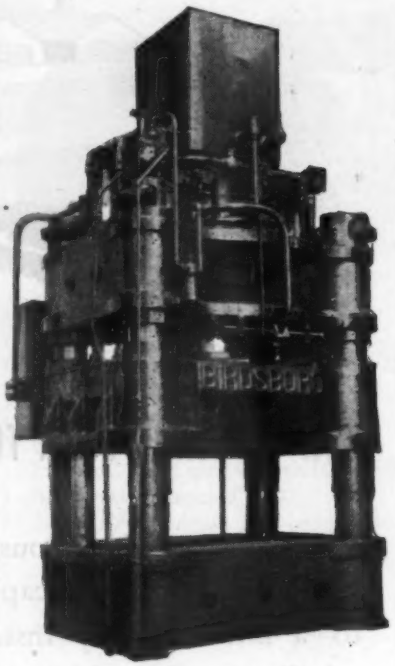

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LATHES, Warner & Swasey #3, 4, & 6, M.D.
LATHES, Warner & Swasey, #5 Geared Head, M.D.
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MILLERS

2H Kearney & Trecker Vert. (2)—1941
U.S. Multi-Millers (4) 1941
No. 25-B Defiance Hor. Bor. Mill 3¼" bar, New 1941
No. 10 Brown & Sharpe—1941
No. 1—12" and 1—18" Cincinnati Plain Automatic millers latest type (2) 1941
No. 2 Cincinnati Vertical Miller, Dial Type 1941
No. 5 Cins. Dial Type Hor. 1942
New No. 3 Wigglesworth
4" Taylor & Fenn Duplex Spline 1941

GRINDERS

No. 72-A—3—Heald Plain 1940
No. 72-A—3—Heald Sizematic 1940
16"x72" Model C Norton 1941
12"x120" Landis Pl. M.D.
No. 10 B & S Plain Grinder, M.D.

LATHES—TURRET LATHES

22"x72" Lodge & Shipley 1941
24"x72" LeBlond Lathe 1941
16"x78" Monarch Lathe (2) 1941
12"x30" Monarch Lathe 1940
14" Model C Monarch, Keller—1941
No. 1A WaWrner & Swasey (2) 1941
6"x8¾" Goss & DeLeeuw Chucking Machine
No. 8R Cincinnati Acme 1941
24" Bullard Vert. Turret, Hi-Sped 1940

MISCELLANEOUS

No. 60 1" New Britain (6)—1941
1½" Consernatic 4 spindle 1940
Gorton Engravers (4) 1941
No. 0-Ajax Forming Roll 1941
No. 21-8A Cochrane-Bly H.S. Saw
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New Delta Drilling Equipment
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No. 5 Cincinnati Plain Mill, S.P.D
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Gridley 1¼"—Model G, late model
New Britain #23, 33 Chuckers
Potter & Johnston #6C Chuckers
New Britain Gridley 1" Model 40 and 1⅝" Model 41 and 42—4 sp.

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Cleveland 2½" Bar Heriz.
Universal 3½" Bar Heriz.
Bullard 36" Rapid Production
Bertram 42" Vertical

DRILLS:

Niles 7' Radial
Cincinnati-Bickford 5', 6' Radials
Pratt & Whitney Gun Barrel Drills & Rifers

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Brown & Sharpe #3—36"
Fellows #64
Fellows Gear Burnisher
Gleason 6" Generator
Gleason 3"—1940 machine
Gleason 8" mfg.

GRINDERS:

Blanchard #18 Rotary Surface
Norton 6x32, 10x24, 18x96
Baxter D. Whitney #23 Cylinder Grinder. Like New
Brown & Sharpe #11 Plain
Brown & Sharpe #18 Univ. & Tool, sav-way Internal
Brown & Sharpe #3 Univ.
Bath 10"x25" Univ.
Cincinnati 12"x36" Univ
Cincinnati #1½ Tool & Cutter
Pfauter Hob Grinder
Bryant #3B, 6, 12, 18 Internal
P & W 14' B.B. Vert. Surface
Farrel Roll Grinder
Norton & Cincinnati Tool & Cutter
Badger #8 Disc Grinder M.D.
Gardner #4 Disc Grinder M.D.

LATHES:

Monarch & LeBlond 14"x6'
Sidney 17"x8'
Badford 20"x12', T.A.
Johnson 30"x24'
Wickes 32"x18'
McCabe 33"x55"x16½'—Two in One
Sundstrand M.D. Stub
Le-Swing 4"x60", 3½"x186"
J & L 2¼x24, 3x36 Flat Turret
Bardons & Oliver #9—3½" Cap. geared head Turret

MILLERS:

Brown & Sharpe #000 Plain, new 1942
Brown & Sharpe #10 Plain, new 1942
Cincinnati #5 Plain SPD
Milwaukee #1½B Vertical
Becker #4B Vertical
Cincinnati #3, #4 Vertical SPD
B&S #3 Vertical SPD
Hanson-Whitney Thread Miller
Waltham Bench Thread Miller
Rowbottom Cam Miller
P & W 5" Automatic
Pratt & Whitney 2" Spline Duplex
Pratt & Whitney 4½"x12", 6"x14", 6"x80" Thread Millers
Cincinnati 12" B.G. Mfg. Becker #7H Lincoln

MISCELLANEOUS:

Boring Machine—Coulter Diamond Borer
Chambering Machine—Pratt & Whitney
Chucking Machines—Potter & Johnson #6-C
Cutalator—Campbell #425, new 1942
Hammers—Helve
Hammer—Bendry #6—150 Lb. Power
Hammer—Bliss 300 Lb. Drop
Honing Machine—Garline Model MCV New
Jig Borer—Cloerman #1830
Keyseater—Pitts & Merrill #6
Shear—Marshalltown #88 Rotary Bevel, M.D.
Tapper—Threadnut #2
Upsetter—Acme 2" Steel

PLANERS:

American 28"x28"x8' — Cincinnati 48"x48"x20' 3 Head
Cincinnati 36"x36"x20' — Gray 84"x72"x18' 4 Head

PRESSES:

Ferracute #DGGF 50 Double Geared 185 ton cap. 30" Stroke. Weight 36,000 lbs., New 1939
W-F 20 Ton Rack & Pinion

BOTWINIK BROTHERS, INC.
373 Welton St. New Haven 9, Conn.

Bending Roll, 10' x ¾" Bertsch Initial Type
Draw Block, Double, 22", M.D.
Grinder, 10' Bridgeport, Knife
Keyseater, #3 Catlin, 23"x2", M.D.
Miller, Universal, #3 Cincinnati, M.D.
Miller Vertical, #3 B. & S., S.P.D.
Miller & Shaper, #14 Cochrane-Bly, Vert., M.D.
Shapers, 20"-24"-32"
Shaper, 36" Morton, Draw Cut.

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

CLOSEOUTS

BORING MILL
VERTICAL

66", 120" Niles
42" Bullard, M.D.
54", 62" Colburn, M.D.

HORIZONTAL

2½" Universal, Binsee
4" Binsee
3" Cleveland

TURRET LATHES

No. 2A, 3A, W. & S. 4⅛" hole
26" Libby, 7⅛" hole
18" Libby, 3⅛" hole
24" Gisholt, 6⅛" hole
Foster Nos. 4, 5, 6
Foster No. 1B, M.D.
W. & S. No. 4 Univ., Grd. Hd., M.D
J. & L. 2¼x24, 3¼x36"
Acme 3¼x36" grd head

GRINDERS

P. & W. 14", 18" B.B. Vert., M.D.
Blanchard 26", 30", M.D.
Modern 12x48", M.D.
Norton Hydr. 12x18", M.D.
Heald No. 50, 55, 60, M.D.
Norton 50"x28', M.D.
Gardner 72" Disc, M.D.
Landis 6x20" Hydraulic, M.D.
Bryant No. 12, M.D.

LATHES

14"x8' Hendey, Taper
48"x12' Harrington Gap Sld. Bed
McCabe 26-42"x14'
32"x25' New Haven, raising blocks to 60"
20"x14' Rahn-Larmon, raised to 24", M.D.
24"x10' Lodge & Shipley Grd. Hd. Taper, M.D.
16"x8' Lodge & Shipley Grd. Hd, Taper, M.D.
14"x6' Mulliner, taper
14"x6' Sebastian Grd. Hd.
9" LeBlond Automatics
Wickes 32"x26', M.D.
LeBlond 36"x21' M.D.
Putnam 36"x80', M.D.

AUTOMATICS

New Britain 1⅝", 6 Spindle
Cleveland Model A, ½", ⅝", 1¼", 2"
Cleveland Model B, 1", 2"
Gridley 4¼", sgle. spdle.
B. & S. Nos. 00, OG, 2
P. & J. No. 6A, M.D.

GEAR CUTTERS

No. 3, 12 Barber-Colman Gear Hobber
No 6 Fellows Gear Shapers
B. & S. No. 8-26", 4-36"
Gleason 11" Bevel

MILLING MACHINES

No. 20 Van Norman
10" P. & W. Automatic
No. 2A Milwaukee, S.P.D.
No. 3S Cincinnati, S.P.D Rpd. traverse, M.D.
Nos. OY, 1Y, 3, 4, 5, B. & S. Plain & Univ.
B. & S. No. 12, 13, 18B
Hall Planetary Model D
Providence Planer Type 32"x8'
Becker Nos. 3, AB, 5, 6
Nos. 3, 4, Cincinnati Vert.
P. & W. No. 12 Profiler, dbl. spindle
30" Pratt & Whitney Profiler
No. 2 Kent-Owens
No. 4, B. & S. Universal

RADIALS

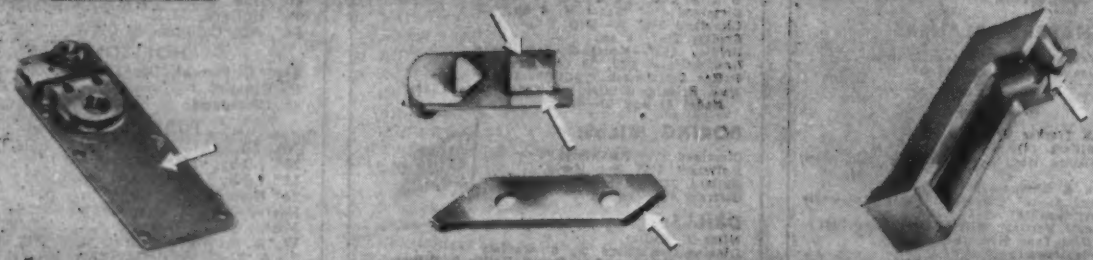
5' Dreses, Full Universal
8' Amer. Triple Purpose
3', 3½' Cinc-Bickford
4' Mueller, M.D.
4', 5' Western, S.P.D.

MISCELLANEOUS

600 ton Birdsboro Hydraulic Press
6 spindle Avey Drill, 15" overhang
300 ton Coining Press, McCabe ⅛" Flanger
Rochester 5B Hammer
Pels 6' Throat punch
P. & W. 6" Vert. shaper
Marvel Metal Band Saw, M.D.
Pipe Machines, 4", 6", 8", M.D.
N.B.P. 15" Slotter, M.D.
150 ton United Forging Press
Thompson-Gibbs Spot Welders 17 KVA
Anderson Tapper, No. 23A Quickwork Rotary Shear
6x80" P. & W. Thread Miller
⅜"x8' Plate Levelling Roll
4x4x⅝" W. & W. Angle Bending Roll

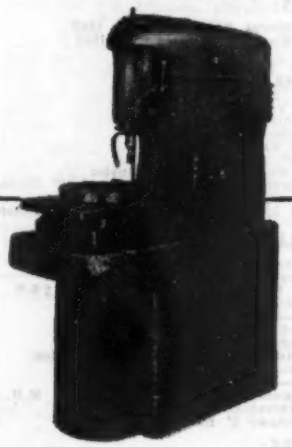
AARON MACHINERY CO.
MONA MEMBER
45 Crosby St.
New York 12, N. Y.

ON PLAIN MILLING OPERATIONS LIKE THESE



SAVE TIME AND MONEY AND MANPOWER

BY USING THE THOMPSON AUTOMATIC PROFILE MILLER



A number of large manufacturers of precision parts are now making substantial savings on a wide variety of plain milling operations by using Thompson Automatic Profile Millers. These are operations that can utilize the advantages of multiple stations, continuous work table movement, elimination of loading time . . . and other features of this versatile and unusual production machine.

Continuous movement of the work table presents a station to the operator for unloading and reloading at regular intervals and thus "paces" the work . . . production rate is determined by the speed of the machine cycle rather than by the inclination of the operator. The complete elimination of loading time and the use of automatic rapid traverse between stations assure that the cutter is working the maximum amount of time. Because the path of the cutter can be irregular and varied instead of only a straight line, the Thompson Automatic Profile Miller eliminates operations on some plain milling jobs that would otherwise require additional equipment, loading and handling.

Write for a copy of new Bulletin 44-A; it describes the many advantages of the Thompson Automatic Profile Miller.

EARL A. THOMPSON MANUFACTURING COMPANY
1300 HILTON ROAD • FERNDALE, MICHIGAN

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5 POTENT POINTS!

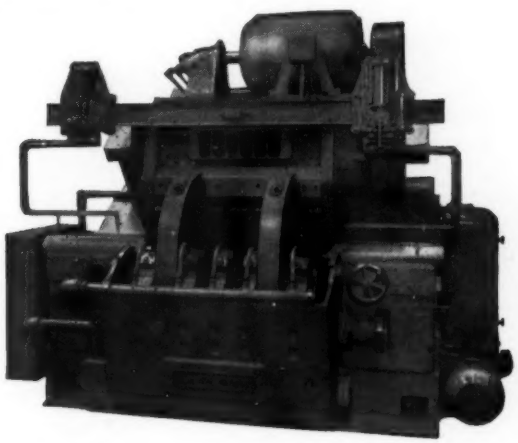
1. We have been building lathes since 1887.

2. LeBlond Lathes today are used on turning operations the world over.

3. The accumulated knowledge of every manufacturing trend in good times and bad—peace and war, gained from thousands of installations is now available to you.

4. Our field engineers are at your service—ready to help you in your development work for the postwar era—particularly along the lines of the difficult, out-of-the-ordinary turning problems.

5. This service is yours for the asking. Contact our nearest dealer or write—



LeBLOND 1-LB CRANKSHAFT LINE BEARING LATHE

ROUGH AND FINISH LINE BEARINGS IN ONE OPERATION

THE R. K. LeBLOND MACHINE TOOL CO.
DEPT. FE46 CINCINNATI 8, OHIO

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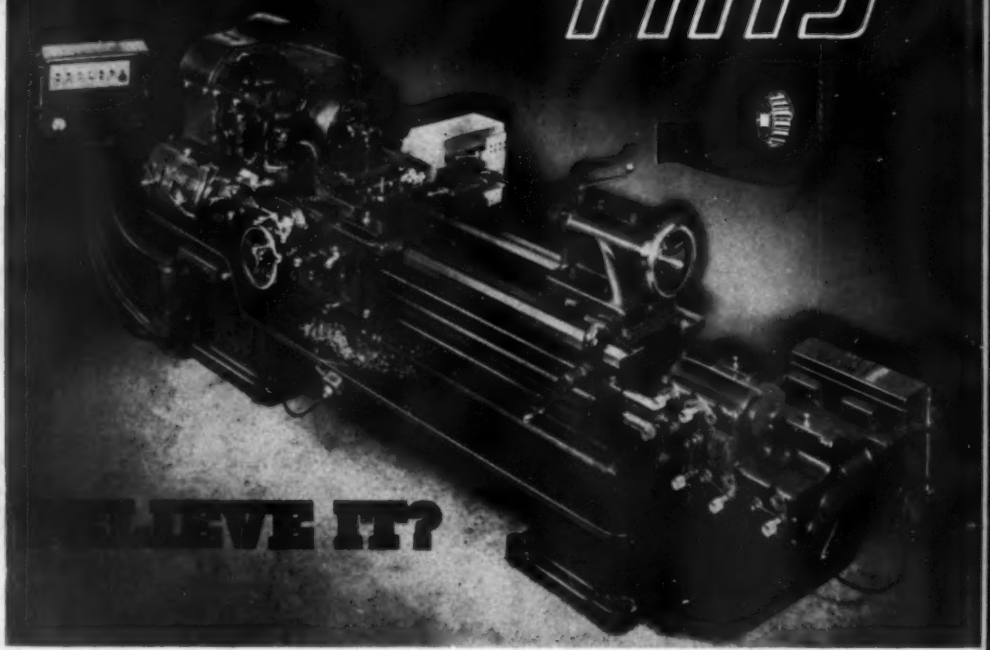

CAN YOU BELIEVE IT?

That a turning lathe could be capable of such work is almost unbelievable — yet this complicated plastics mould and broach actually were made on a Monarch "SHAPE-MASTER" Lathe, latest addition to the Monarch line.

All kinds of moulds, including broaches and cavities for multiple plastics moulds, punches, dies and many other classes of metal products having irregular shapes can be turned out on the Monarch "SHAPE-MASTER". In fact in turning, boring and facing it will reproduce any desired shape that a single point tool can machine and do it with — to quote the manufacturer — "uncanny accuracy", to which 24 Timken Tapered Roller Bearings make important contributions.

The Monarch Machine Tool Company has used Timken Bearings in its machines for many years and knows what they can do in promoting speed; precision; dependability; endurance; and economy; hence their liberal use in this new and revolutionary lathe. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS